2. PREFERRED ALTERNATIVE

Chapter 2 describes the Preferred Alternative and reasons for selecting DSA 9 as the Preferred Alternative. This section also describes additional design work and other studies completed for the Preferred Alternative, and presents updated impacts associated with the Preferred Alternative.

2.1 DESCRIPTION OF THE PREFERRED ALTERNATIVE

The FHWA and NCTA (a division of NCDOT as of July 27, 2009) have identified Detailed Study Alternative (DSA) 9 as the Preferred Alternative, based on the information in the Draft EIS and input received during the public comment period (**Chapter 3**). The Preferred Alternative is shown in **Figure 2-1**. DSA 9 was identified as the Recommended Alternative in the Draft EIS. DSA 9 in relation to the other eleven DSAs is shown in **Figure 1-2**.

2.1.1 GENERAL DESCRIPTION

The Gaston East-West Connector, also known as the Garden Parkway, would be a controlled-access median-divided toll facility extending from I-85 west of Gastonia in Gaston County to I-485 near the Charlotte-Douglas International Airport in Mecklenburg County. The typical section for the Preferred Alternative is shown in **Figure 2-2**. The eastern terminus of the project also would tie into NC 160 (West Boulevard) just east of I-485. The total length of the Preferred Alternative is approximately 21.9 miles.

From west to east, interchanges along the Preferred Alternative would be located at I-85, US 29-74, Linwood Road (SR 1133), US 321, Robinson Road (SR 2416), NC 274 (Union Road), NC 279 (South New Hope Road), NC 273 (Southpoint Road), Dixie River Road (SR 1155), and I-485. An interchange at Bud Wilson Road (SR 2423) was proposed for all DSAs in the Draft EIS, but was eliminated as part of the Preferred Alternative (**Section 2.3.1.6**).

The project would include mainline bridge crossings of Blackwood Creek, an unnamed tributary to Crowders Creek (Stream S146) located just east of US 321, Catawba Creek, South Fork Catawba River, and Catawba River.

Design refinements to the Preferred Alternative incorporated since the Draft EIS was prepared are discussed in **Section 2.3.1**. They generally include modifications to improve access to neighborhoods, reduce impacts, and maintain local connectivity.

The boundaries of the Preferred Alternative study corridor have been expanded from what was shown for DSA 9 in the Draft EIS. The study corridor was expanded to include cross-street improvements that extended beyond the original boundaries, and areas where access roads and service roads are proposed outside the original corridor boundaries. The expanded study corridor areas are shown in **Figure 2-3** in a different color than the original study corridor boundaries.

2.1.2 DESIGN CRITERIA

The proposed design speed is 70 miles per hour (mph) for the mainline, which would accommodate a posted speed limit of 65 mph. The general design criteria for the project are presented in Appendix D of the Draft EIS.

The Preferred Alternative would have four 12-foot travel lanes, with a 50-foot median and 12-foot paved inside and outside shoulders (**Figure 2-2**). The typical right of way would be approximately 280 feet, with additional right of way required for interchanges, service roads, and improvements to intersecting roads. In addition, between NC 273 (Southpoint Road) and I-485, there would be an auxiliary lane in each direction, as there was in the preliminary designs shown in the Draft EIS.

This typical section in **Figure 2-2** is different than the one presented in Figure 2-3 and Section 2.3.1.3 of the Draft EIS. In the Draft EIS, all DSAs were proposed to have six travel lanes with a 46-foot median, and a typical right of way of approximately 300 feet. Section 2.3.1.3 of the Draft EIS notes that the proposed six lanes were determined to adequately carry projected 2025 non-toll traffic volumes, and that the number of lanes and median width may be changed based on new traffic forecasts prior to the Final EIS.

The currently proposed number of through lanes (four) shown in the typical section in **Figure 2-2**, with the auxiliary lanes noted above between NC 273 (Southpoint Road) and I-485, would be sufficient to carry projected year 2035 toll traffic at an adequate level of service (LOS D or better). The 2035 forecasts are documented in the *Gaston East-West Connector Updated Traffic Forecast and Revised Preliminary Design Traffic Capacity Analysis for the Preferred Alternative* (HNTB, May 2010), incorporated by reference and summarized in **Section 2.3.5.**

Change in Typical Section

The number of through lanes along the Gaston East-West Connector was reduced from six in the Draft EIS to four. The typical right of way also was reduced 20 feet.

The proposed median was reduced from 70 feet (if four lanes were constructed) to 50 feet in the refined typical section. This change also reduced the typical right of way width from 300 feet to 280 feet.

Although not part of the ultimate project, if a fifth and sixth lane are needed in the future beyond the horizon year, they would be constructed to the inside, resulting in a 26-foot paved median (two 10-foot shoulders and six feet for a barrier, bridge piers, signs, etc.) instead of the original 46-foot median proposed in the Draft EIS.

2.1.3 TOLLING INFORMATION

Planning for Tolls. The NCDOT *2009-2015 Statewide Transportation Improvement Program* (STIP) includes the project as a toll facility. In 2000, the Gaston Urban Area Metropolitan Planning Organization (GUAMPO) Transportation Advisory Committee passed a resolution stating its support of the use of alternative funding methods to accelerate construction of the project, including methods that would require the payment of tolls by motorists. The 2035 Long Range Transportation Plans (LRTPs) for the Gaston Urban Area Metropolitan Planning Organization (GUAMPO) and Mecklenburg-Union MPO (MUMPO) include the project as a toll facility.

Toll Collection System. Tolls would be collected by an electronic toll collection (ETC) system. There would be no cash toll booths. The primary means of ETC involves setting up an account with NCTA and using a transponder/receiver system. The transponder is a small device usually mounted on the windshield of a vehicle. The receiver is typically mounted over the roadway, and it electronically collects tolls from a driver's account as the vehicle travels under it at highway speed.

The NCTA will work with other toll authorities to enable, where possible, other systems' transponders to work on the Gaston East-West Connector. Toll road users also will have the option of acquiring transponders with prepaid tolls. For travelers who do not have a transponder, a video system will capture license plate information and NCTA will bill the vehicle's registrant.

In addition, NCTA would operate a facility in the immediate vicinity of the project that accepts cash payments for prepaid tolls, so establishing an account would not be required. It is anticipated that this storefront-type facility would operate from an existing commercial building or strip shopping center within the project area. The facility is not expected to generate a high volume of traffic.

Incorporating Tolls In Preliminary Design. There are minimal differences between a roadway design with and without an ETC system. The ETC equipment, which is primarily mounted on an overhead structure, takes up little space, and would not require additional right of way. While the right-of-way requirements may not differ between a non-toll facility and a toll facility, the alignment of loop ramps that have ETC equipment may slightly differ. At these locations, the loop ramp is modified slightly to provide a tangent section that facilitates accurate video capture of license plates.

Financial Feasibility of Tolling and Toll Rates. The financial feasibility of tolling the proposed project is being evaluated in progressively more detail as the project moves forward. The following documents are incorporated by reference into this Final EIS and are available for review and download on the NCTA Web site: www.ncturnpike.org/projects/gaston.

- *Proposed Gaston East-West Connector Preliminary Traffic and Revenue Study* (Wilbur Smith Associates, October 2006). This document was incorporated by reference into the Draft EIS and summarized in Section 2.4.3 of the Draft EIS.
- *Update for Gaston East-West Connector Preliminary Traffic and Revenue Study* (Wilbur Smith Associates, December 2009). The update was conducted at a preliminary level of study. Updates from the 2006 study included toll collection methods and alignment and interchange configurations.

Prior to project construction, an Investment Grade Traffic and Revenue Study would be prepared for use by bond rating agencies and investors to evaluate financial return on the project.

The initial price of the toll would be determined as part of the Investment Grade Traffic and Revenue Study. The price of the toll likely will vary over time, based upon variables such as managing demand, financing the initial construction of the project, and paying for roadway operations and maintenance. The toll rate will differ for cars and trucks and will also be dependent on the collection method, i.e., transponder, registered license plate, or bill via US Mail.

2.2 REASONS FOR SELECTING DSA 9 AS THE PREFERRED ALTERNATIVE

According to FHWA regulations (23 CFR 771.125) and Council on Environmental Quality regulations (40 CFR 1502.14), the lead agency(ies) should identify a Preferred Alternative in a Final EIS. This is the alternative the lead agency(ies) believes would fulfill its statutory mission and responsibilities, giving consideration to social, economic, environmental, technical and other factors.

The FHWA and NCTA (a division of NCDOT since July 27, 2009) have identified DSA 9 as the Preferred Alternative, for the reasons listed below. DSA 9 was identified by the FHWA, NCTA,

and NCDOT as the Recommended Alternative in the Draft EIS (Section 2.5). Generally, the reasons cited in the Draft EIS for selecting DSA 9 as the Recommended Alternative still apply to its selection as the Preferred Alternative. This decision was made prior to the design refinements described in **Section 2.3**. The relative comparisons listed below still apply, since it is expected that design refinements for each DSA would be similar to those described in **Section 2.3**, and therefore the relative values would be similar.

Please note this list is not in order of importance and does not represent all benefits or impacts of DSA 9, just those elements that differentiated DSA 9 when compared to the other DSAs. Additional information regarding input received during the Draft EIS public review period is included at the end of this section.

Cost and Design Considerations

- DSA 9 is one of the shortest alternatives at 21.9 miles (all alternatives range from 21.4 to 23.7 miles).
- DSA 9 had the second-lowest median total cost ($1,282 million) (all alternatives ranged from $1,281 million to 1,378.4 million).

  *Note: Updated costs for the Preferred Alternative are presented in **Section 2.3.4**.*

Human Environment Considerations

- DSA 9 is one of the four DSAs with the fewest numbers of residential relocations at 348 residential relocations (the range being 326 to 384 residential relocations).

  Note: Design refinements for the Preferred Alternative resulted in a reduction in residential relocations by four residences.
- Although DSA 9 is higher in the range of business relocations at 37 (the range being 24 to 40 business relocations), it would avoid impacts to Carolina Specialty Transport (provides transportations services to special needs groups) that would occur under DSAs 58, 64, 68, 76, 77 and 81.

  Note: Design refinements for the Preferred Alternative associated with the provision of a service road in the southeast quadrant of US-29-74 resulted in one additional business relocation.
- DSA 9 is in the middle of the range of total neighborhood impacts at 25 impacted neighborhoods (the range being 21 to 32 impacted neighborhoods).

  *Note: In the Draft EIS, impacts to the White Oak subdivision from Corridor Segment JX4 (DSAs 5, 9, 23, 27, 77, and 81) were inadvertently not included in Table 3-5 of the Draft EIS). In addition, impacts to the Saddlewood neighborhood were double-counted for DSAs 4, 5, 9, 22, 23, 27, 76, 77, and 81. (**Appendix A, Errata**). The total number of neighborhood impacts for DSA 9 is 25 based on the Draft EIS preliminary design, with the range being 21 to 32.*
- DSA 9 would have no direct impacts to schools (DSAs 5, 23, and 27 also avoid direct impacts to schools).
- DSA 9 is one of eight DSAs (DSAs 5, 9, 23, 27, 64, 68, 77, 81) that would not require relocation of known cemeteries.
- At Linwood Road, DSA 9 is one of three alternatives (DSAs 4, 5, and 9) that would avoid impacting either the Karyae Park YMCA Outdoor Family Center or the Pisgah Associate Reformed Presbyterian Church (part of the church property is also an historic site eligible for listing on the National Register of Historic Places).

- DSA 9 is one of the three alternatives (DSAs 4, 5, and 9) farthest from Crowders Mountain State Park.
- DSA 9 would avoid right-of-way requirements from Daniel Stowe Botanical Garden (DSAs 4, 22, 27, 58, 68, 76, and 81 also avoid these right-of-way requirements).
- DSA 9 would avoid the relocation of Ramoth AME Zion Church and cemetery, which is part of the Garrison Road/Dixie River Road community (DSAs 4, 22, 27, 58, 68, 76, and 81 also avoid this church).
- DSA 9 is one of the eight alternatives (DSAs 4, 9, 22, 27, 58, 68, 76, and 81) with the least amount of right of way required from future Berewick Regional Park in Mecklenburg County.

  Note: Design refinements for the Preferred Alternative modified the I-485 interchange design and shifted it northward, resulting in no encroachment on Berewick Regional Park.

Physical Environment Considerations

- DSA 9 is in the middle range of estimated numbers of receptors impacted by traffic noise at 245 receptors (the range being 204 to 309 impacted receptors).

  Note: Updated 2035 traffic forecasts and design refinements for the Preferred Alternative resulted in an updated estimate of 283 receptors impacted by traffic noise.
- DSA 9 is one of the alternatives (DSAs 4, 5, 9, 22, 23, and 27) that would impact the least acreage of land in Voluntary Agricultural Districts. DSA 9 also is one that is expected to have the least indirect and cumulative effects to farmlands.
- DSA 9 is one of the alternatives with the fewest power transmission line crossings at fourteen crossings (the range being 13 to 18 crossings).

Cultural Resources Considerations

- DSA 9 is one of six alternatives (DSAs 4, 5, 9, 22, 23, and 27) that would not require right of way from the Wolfe Family Dairy Farm historic site. Selection of DSA 9 makes it more likely that, if the US 321 Bypass is constructed at some future time, the project would also avoid the Wolfe Family Dairy Farm historic site.
- DSA 9 is one of four alternatives (DSAs 5, 9, 23, and 27) with low to moderate potential to contain archaeological sites requiring preservation in place or complex/costly mitigation.

  Note: Based on the Intensive Archaeological Survey conducted for the Preferred Alternative (Coastal Carolina Research, February 2010), the Office of State Archaeology concurred that there were no archaeological resources within the Area of Potential Effect eligible for the National Register of Historic Places. This study is summarized in ***Section 2.5.3.2****.*

Natural Resources Considerations

- DSA 9 is one of eight alternatives (DSAs 4, 9, 22, 27, 58, 68, 76, and 81) that would cross the South Fork Catawba River and the Catawba River where the rivers have been more affected by siltation and they are less navigable, and water-based recreation would be affected less than with DSAs that cross farther south.

- DSA 9 would impact the least amount of Upland Forested Natural Communities at 882 acres (all alternatives range from 882 to 1,042 acres).

  Note: Design refinements for the Preferred Alternative resulted in an updated estimate of 792 acres of impact to upland forested natural communities.

- DSA 9 is one of the alternatives (DSAs 4, 9, 22, and 76) having the lowest potential to indirectly affect upland wildlife species due to habitat fragmentation.
- DSA 9 is lower in the range of impacts to ponds at 4.1 acres (all alternatives range from 2.1 to 6.3 acres).

  Note: Design refinements for the Preferred Alternative resulted in an updated estimate of 4.5 acres of impacts to ponds.

- DSA 9 is lower in the range of impacts to wetlands at 7.5 acres (all alternatives range from 6.9 to 13.2 acres).

  Note: Design refinements for the Preferred Alternative resulted in an updated estimate of 7.0 acres of impacts to wetlands.

- DSA 9 is lower in the range of impacts to perennial streams at 38,894 linear feet (all alternatives range from 36,771 to 50,739 linear feet).

  Note: Design refinements for the Preferred Alternative resulted in an updated estimate of 29,033 linear feet of impacts to perennial streams.

- DSA 9 would have the fewest number of stream crossings at 91 (all alternatives range from 91 to 120 crossings).
- DSA 9 is one of eight alternatives (DSAs 5, 9, 23, 27, 64, 68, 77, and 81) that has a biological conclusion of No Effect relating to the federally endangered Schweinitz's sunflower.

Public Involvement After the Draft EIS

The formal public review period for the Draft EIS was from May 22, 2009 (the day the Notice of Availability of the Draft EIS was published in the Federal Register (Volume 74, No. 98, page 24006) to July 21, 2009. The Draft EIS was made available for public review beginning May 13, 2009, at local libraries and government offices.

A series of Public Hearings and Open Houses was held the week of June 22, 2009. The purpose of the public review period and the Pre-Hearing Open Houses/Public Hearings was to receive input on the Draft EIS and project corridors and design, as well as the selection of DSA 9 as the Recommended Alternative. These are described in more detail in **Section 3.1.2**. Approximately 785 people attended the two Public Hearings and 890 people attended the four Pre-Hearing Open Houses.

Comments were received via comment forms, emails, letters, and Public Hearing transcripts. Most comments received did not state a DSA preference. There were approximately twice as many public commenters who stated they opposed the project in general compared to those who supported the project.

As described in **Section 3.3.1**, three petitions were received. Two petitions were in general opposition to the project, one with approximately 7,000 signatures and the other with 275 signatures. The third petition, with 109 signatures, opposed DSAs that would impact the Mt. Pleasant Baptist Church Cemetery (DSAs 4, 9, 22, 27, 58, 68, 76, and 81). The NCTA did not verify the signatures on the petitions or check for duplicates. The refined preliminary design

for the Preferred Alternative would not impact gravesites in the existing or historic boundaries of the cemetery (**Section 2.3.1.10**).

None of the public comments received resulted in changes to any of the reasons listed above for selecting DSA 9 as the Preferred Alternative. Local government agencies, such as GUAMPO and MUMPO, support the project. Detailed information regarding comments received from the public, as well as local, state, and federal agencies, is presented in **Chapter 3** of this Final EIS. Common generalized comments, and responses to those comments, are included in **Section 3.3.2**. All comments received on the Draft EIS, and responses to the comments, are included in **Appendix B**.

2.3 DESIGN REFINEMENTS TO THE PREFERRED ALTERNATIVE

Several design modifications were made to the Preferred Alternative as a result of public involvement activities, coordination with environmental resource and regulatory agencies, and comments received during the Draft EIS public review period. The following sections describe the design refinements (**Section 2.3.1**), service roads (**Section 2.3.2**), avoidance and minimization of impacts to Waters of the US (**Section 2.3.3**), updated cost estimates (**Section 2.3.4**), and traffic forecasts and operational analyses (**Section 2.3.5**) for the Preferred Alternative.

Figure 2-3a-r shows the refined preliminary design for the Preferred Alternative that incorporates the design modifications and service roads described in **Sections 2.3.1** and **2.3.2**.

2.3.1 DESIGN REFINEMENTS

The preliminary design refinements described in this section include mainline design changes (median width and realignment), access road changes, interchange reconfiguration or elimination, and the addition of service roads, as listed below. **Appendix H** includes graphics that show the "before and after" preliminary designs for all items listed, except "Reduce Median by 20 Feet and Revise Typical Section", and "Retain the US 29-74 Interchange".

- Reduce Median by 20 Feet and Revise Typical Section
- Modify Access to Matthews Acres Subdivision
- Retain the US 29-74 Interchange
- Modify the Forbes Road Grade Separation
- Compress the Robinson Road Interchange
- Eliminate the Bud Wilson Road Interchange
- Compress the NC 274 (Union Road) Interchange
- Relocate Tucker Road Connection to Canal Road
- Realign Mainline to Avoid Recreation Fields and Provide Access Road to NC 273 (Southpoint Road)
- Reconfigure the NC 273 (Southpoint Road) Interchange to Avoid Historic Boundary of Mt. Pleasant Baptist Church Cemetery
- Relocate Boat Club Road Connection North of Mainline to NC 273 (Southpoint Road)
- Reconfigure the I-485 Interchange and Dixie River Road Interchange

Many of the design refinements result in reduced impacts to jurisdictional resources. The USEPA, USFWS, NCDWQ, and NCWRC provided comments on the Draft EIS that included general requests for additional consideration of avoidance and minimization measures for jurisdictional resources. In addition, the USEPA specifically requested that the NCTA review the mainline design and interchange configurations for opportunities to reduce the proposed project's footprint. The NCWRC specifically requested consideration of a narrower median.

2.3.1.1 Reduce Median by 20 Feet and Revise Typical Section

Preliminary Design in the Draft EIS. The preliminary design typical section for DSA 9 and all DSAs included six through lanes and a 46-foot median (Draft EIS Figure 2-3). The preliminary design also included an additional auxiliary lane in each direction between the NC 273 (Southpoint Road) interchange and the I-485 interchange. The Draft EIS acknowledges that the number of through lanes might be reduced to four based upon updated 2035 traffic projections (Draft EIS Section 2.4.1), resulting in a four-lane road with a 70-foot median.

Public Comments Received. Comments were received from environmental resource and regulatory agencies requesting minimization of the construction footprint where possible.

Refined Preliminary Design for the Preferred Alternative. Traffic forecasts were updated for the Preferred Alternative, including updates to the horizon year from 2030 to 2035. The forecasts are documented in the *Gaston East-West Connector Updated Traffic Forecast and Revised Preliminary Design Traffic Capacity Analysis for the Preferred Alternative* (HNTB, May 2010).

Based on a review of year 2035 traffic projections (Toll Scenario) for the Preferred Alternative, two through lanes in each direction are needed, along with an additional auxiliary lane in each direction between the NC 273 (Southpoint Road) interchange and the I-485 interchange. With this configuration, the mainline is projected to operate at LOS D or better through 2035.

Design criteria for the Preferred Alternative are discussed in **Section 2.1.2**. **Figure 2-2** shows the typical section for the Preferred Alternative.

2.3.1.2 Modify Access to Matthews Acres Subdivision

Preliminary Design in the Draft EIS. The preliminary design for DSA 9 shown on Figure 2-9b in the Draft EIS and on the Corridor Design Public Hearing Maps (April 24, 2009) shows existing access to the Matthews Acres Subdivision would be cut off, and new access provided via a westward extension of Belfast Drive to Diane 29 Theater Road. This extension would cross Bessemer Branch, and the crossing type was changed from a triple box culvert to a bridge as a result of Concurrence Point 2a. Existing access to Matthews Acres is via Belfast Drive to Brightington Lane/Northwynn Road to Shannon Bradley Road (SR 1135).

Public Comments Received. Several residents of the Matthews Acres subdivision provided verbal comments during the Pre-Hearing Open House held on June 22, 2009 at the Gastonia Adult Recreation Center. In addition, members of the Broomfield Neighborhood Watch (includes neighborhoods surrounding Shannon Bradley Road) provided comments at a small group meeting held July 7, 2009. The residents of the area requested that the proposed access be modified to more directly connect to Shannon Bradley Road. Residents of Matthews Acres are included in the broader neighborhood area that surrounds Shannon Bradley Road north of US 29-74.

Refined Preliminary Design for the Preferred Alternative. The preliminary design for the Preferred Alternative was altered by extending Belfast Drive eastward, under the mainline, to tie directly back into Shannon Bradley Road. The mainline would be bridged over the Belfast Drive extension.

This new access would be similar to the access that currently exists (i.e., Matthews Acres access is from Shannon Bradley Road) and would provide the shortest route to reconnect Matthews Acres to the rest of the community surrounding Shannon Bradley Road.

Figure 2-3a and **Appendix H**, **Figure H-1**, show the Preferred Alternative refined preliminary design in this area.

2.3.1.3 Retain the US 29-74 Interchange

Preliminary Design in the Draft EIS. The preliminary design for DSA 9 shown on Figure 2-9e in the Draft EIS and on the Corridor Design Public Hearing Maps (April 24, 2009) includes a half clover-leaf interchange with US 29-74. Section 2.4.5.1 of the Draft EIS discusses the option of eliminating this interchange, and notes that a final decision on inclusion/elimination would be documented in the Final EIS.

Public Comments Received. As discussed in Section 2.4.5.1 of the Draft EIS, environmental resource and regulatory agencies requested that NCTA consider the removal of the US 29-74 interchange due to estimated impacts to wetlands and streams.

The public was asked about the potential elimination of the US 29-74 interchange at the series of Citizens Informational Workshops held in August 2008 (Series #3). As summarized in Section 9.1.1.3 of the Draft EIS, there were 205 written comments received during this workshop series. Of these, 23 commenters specifically stated they believed the interchange was not needed, while 25 commenters stated they believed the interchange was needed.

Decision Not to Revise the Preliminary Design for the Preferred Alternative. An updated traffic and revenue study prepared for the Preferred Alternative included an evaluation of the effects on toll revenue if the US 29-74 interchange was eliminated from the project. The study, titled *Proposed Gaston East-West Connector December 2009 Update to the 2006 Preliminary Study Interchange Analysis* (Wilbur Smith Associates, December 2009), is incorporated by reference.

Based on the results of this study, there would be substantial revenue loss from elimination of the US 29-74 interchange. There would be approximately 12 to 13 percent fewer transactions and approximately 5 percent less revenue. In the vicinity of the Gaston East-West Connector, US 29-74 is a four-lane divided arterial that provides direct access into downtown Gastonia.

Based on the effect of the interchange on revenue forecasts as described in the updated traffic and revenue study, and the importance of US 29-74 as a direct route to downtown Gastonia, the NCTA has determined that the US 29-74 interchange would be retained as part of the Preferred Alternative's ultimate design.

2.3.1.4 Modify the Forbes Road Grade Separation

Preliminary Design in the Draft EIS. The preliminary design for DSA 9 shown on Figure 2-9o in the Draft EIS and on the Corridor Design Public Hearing Maps (April 24, 2009) shows a grade separation of Forbes Road over the mainline.

Public Comments Received. No specific comments were received regarding this grade separation. The redesigned grade separation avoids impacts to Stream S148.

Refined Preliminary Design for the Preferred Alternative. The curve radius of the grade separation of Forbes Road over the mainline was reduced, reducing the length of improvements along Forbes Road.

Figure 2-3h and **Appendix H**, **Figure H-2**, show the Preferred Alternative refined preliminary design in this area.

2.3.1.5 Compress the Robinson Road Interchange

Preliminary Design in the Draft EIS. The preliminary design for DSA 9 shown on Figure 2-9q in the Draft EIS and on the Corridor Design Public Hearing Maps (April 24, 2009) includes a partial clover-leaf interchange, with standard ramps in the northeast and northwest quadrants and a loop and standard ramp in the southeast quadrant. Pam Drive was proposed to be closed at Robinson Road and subdivision traffic routed to Saddlewood Road to access Robinson Road.

Public Comments Received. During the Pre-Hearing Open Houses and public review period, several comments were received from residents in the Pam Drive neighborhood expressing their desire to keep Pam Drive connected to Robinson Road. Also, the property owner in the northwest quadrant requested that design modifications be considered to reduce impacts to their property. The proposed ramp shown in the Draft EIS passed close to their house and access control along Robinson Road would extend past their property. The property owner across Robinson Road, in the northeast quadrant, supported this request.

Refined Preliminary Design for the Preferred Alternative. The preliminary design for the Preferred Alternative was altered by connecting Pam Drive to Robinson Road at the ramp terminus, and by moving the ramps in the northeast and northwest quadrant closer to the mainline. Traffic projections and operations analysis indicate that future loop ramps in the northeast and northwest quadrants (accommodated in the previous interchange design) likely would not be needed. Access control along Robinson Road to the north of the interchange was shortened, so the existing access driveway to the property in the northwest quadrant can be maintained. The refined design also shifts the right of way from approximately 10 feet from the house on the property in the northwest quadrant to approximately 300 feet from the house.

Figure 2-3h and **Appendix H**, **Figure H-3**, show the Preferred Alternative refined preliminary design in this area.

2.3.1.6 Eliminate the Bud Wilson Road Interchange

Preliminary Design in the Draft EIS. The preliminary design for DSA 9 shown on Figure 2-9s in the Draft EIS and on the Corridor Design Public Hearing Maps (April 24, 2009) includes a diamond interchange at Bud Wilson Road.

Public Comments Received. No specific comments regarding this interchange were received from the public. The elimination of this interchange was considered in relation to potential cost savings and to the requests from environmental resource and regulatory agencies to minimize the construction footprint or eliminate interchanges where possible.

Refined Preliminary Design for the Preferred Alternative. The projected traffic volumes at all interchanges were reviewed to identify candidate interchanges for elimination. The Bud Wilson Road interchange was the only one identified for possible elimination.

Additional modeling conducted for the Preferred Alternative in the *Proposed Gaston East-West Connector December 2009 Update to the 2006 Preliminary Study Interchange Analysis* (Wilbur Smith and Associates, December 2009), showed that eliminating this interchange would decrease transactions by approximately 9 percent and revenue by 4 percent. However, unlike US 29-74, which is a major urban arterial that provides direct access to downtown Gastonia, Bud Wilson Road is a rural collector. The Robinson Road interchange and NC 274 (Union Road) interchange would generally provide access to the same areas as the Bud Wilson Road interchange.

Based on the updated traffic and revenue forecasts described above, and the fact that other interchanges would provide similar access, the NCTA eliminated the Bud Wilson Road interchange from the Preferred Alternative's ultimate design.

Figure 2-3i and **Appendix H**, **Figure H-4**, show the Preferred Alternative refined preliminary design in this area. During final design, the Bud Wilson Road grade separation shown in the figures likely would be redesigned to shorten the length of the improvements on Bud Wilson Road and reduce costs.

2.3.1.7 Compress the US 274 (Union Road) Interchange

Preliminary Design in the Draft EIS. The preliminary design for DSA 9 shown on Figure 2-9v and Figure 2-9x in the Draft EIS and on the Corridor Design Public Hearing Maps (April 24, 2009) includes a half clover-leaf interchange at NC 274 (Union Road). The half-clover-leaf interchange was selected to minimize impacts to the Carolina Speedway, located on the east side of NC 274. The Carolina Speedway is a privately-owned 0.4-mile clay oval vehicular race track with spectator stands built in 1962. It was determined not eligible for listing on the National Register of Historic Place (NRHP).

Public Comments Received. Operators of the speedway provided input at the Pre-Hearing Open Houses in June 2009 and also at a site visit on October 19, 2009. The operators were concerned about parking and maintaining operations in the "pit area" on the north end of the speedway.

The speedway operators stated that on any given race night, approximately 850 people are in the grandstand during the race, along with approximately 400 people in the pit area. The pit area has held up to 110 vehicles during larger race events. The main grassy parking area in front of the grandstand can hold approximately 500 vehicles. Overflow parking across the street can accommodate an additional 300 vehicles.

Refined Preliminary Design for the Preferred Alternative. The preliminary design for the Preferred Alternative was altered by shifting the mainline alignment northward and changing the interchange from a half-clover-leaf to a compressed diamond. These design modifications would minimize impacts to operations at the Carolina Speedway. The pit area, which they stated is important to the operation of their events, would be maintained.

Figure 2-3k and **Appendix H**, **Figure H-5**, show the Preferred Alternative refined preliminary design in this area.

2.3.1.8 Relocate Tucker Road Connection to Canal Road

Preliminary Design in the Draft EIS. The preliminary design for DSA 9 shown on Figure 2-9cc in the Draft EIS and on the Corridor Design Public Hearing Maps (April 24, 2009) includes a reconnection of Tucker Road south of the interchange since the proposed project would eliminate Tucker Road's connection with Southpoint Road. This reconnection would extend south to Canal Road, which connects to Southpoint Road (NC 273).

Public Comments Received. No specific comments were received regarding this access road. The realigned access road avoids impacting the edge of the South Fork Catawba Creek 100-year floodplain.

Refined Preliminary Design for the Preferred Alternative. The proposed extension connecting Tucker Road to Canal Road was shifted north to be adjacent to the south side of the electric power easement.

Figure 2-3n and **Appendix H**, **Figure H-5**, show the Preferred Alternative refined preliminary design in this area.

2.3.1.9 Realign Mainline to Avoid Recreation Fields and Provide Access Road to NC 273 (Southpoint Road)

Preliminary Design in the Draft EIS. The preliminary design for DSA 9 shown on Figure 2-9cc in the Draft EIS and on the Corridor Design Public Hearing Maps (April 24, 2009) encroaches on the Duke Energy Corporation/Belmont Optimist Club's newly expanded football field and the back edge of their baseball field.

The Draft EIS preliminary design was created prior to the improvements the Optimist Club made to the site. The site is privately-owned by Duke Energy Corporation and is under a long-term lease to the Belmont Optimist Club (therefore it is not a Section 4(f) resource). No access road was shown to the recreational fields in the Draft EIS preliminary design.

Public Comments Received. Project engineers met on-site with the Belmont Optimist Club President on May 11, 2009 to review the Draft EIS preliminary design in relation to the recreational fields and to provide information about the use of the fields. After this meeting, it was determined that minor design modifications could be made that would avoid the newly expanded recreation fields.

Refined Preliminary Design for the Preferred Alternative. The refined design shifts the mainline slightly northward. The Duke Energy Corporation/Belmont Optimist Club fields are avoided, as well as two electric transmission towers. Access to the Duke Energy Corporation/Belmont Optimist Club recreational fields and other landlocked properties in the southeast quadrant of the project's interchange with Southpoint Road (NC 273) would be provided by constructing a new access roadway from Southpoint Road north and east to Boat Club Road.

Figure 2-3n and **Appendix H**, **Figure H-6**, show the Preferred Alternative refined preliminary design in this area.

2.3.1.10 Reconfigure the NC 273 (Southpoint Road) Interchange to Avoid Historic Boundary of Mt. Pleasant Baptist Church Cemetery

Preliminary Design in the Draft EIS. The preliminary design for DSA 9 shown on Figure 2-9cc in the Draft EIS and on the Corridor Design Public Hearing Maps (April 24, 2009) includes a loop and ramp in the northwest quadrant of the NC 273 (Southpoint Road) interchange. As noted in the Draft EIS Section 3.2.6.1, this quadrant would require approximately 2.1 acres of land from the south and east sides of the parcels currently owned by Mt. Pleasant Baptist Church for the Mt. Pleasant Baptist Church Cemetery.

Public Comments Received. A petition was received with 109 signatures, which opposed DSAs that would impact the Mt. Pleasant Baptist Church Cemetery (DSAs 4, 9, 22, 27, 58, 68, 76, and 81).

Refined Preliminary Design for the Preferred Alternative. During the *Gaston East-West Connector Intensive Archaeological Survey* prepared for the project (Coastal Carolina Research, February 2010), gravesites with headstones were discovered south of the parcels currently owned by Mt. Pleasant Baptist Church. Research indicated that the cemetery once extended south of the current property boundaries into the area where the gravesites were found.

The refined preliminary design reconfigures this quadrant of the interchange from a loop and ramp to a compressed ramp. This modification would avoid the historic boundary of the cemetery where the gravesites were found. Approximately 0.3 acres of right of way would still be required from the undeveloped wooded parcel adjacent to NC 273, currently owned by Mt. Pleasant Baptist Church, but no gravesites were found in this location.

Figure 2-3n and **Appendix H, Figure H-6**, show the Preferred Alternative refined preliminary design in this area.

2.3.1.11 Relocate Boat Club Road Connection North of Mainline to NC 273 (Southpoint Road)

Preliminary Design in the Draft EIS. The preliminary design for DSA 9 shown on Figure 2-9cc in the Draft EIS and on the Corridor Design Public Hearing Maps (April 24, 2009) includes a reconnection of Boat Club Road north of the interchange. This reconnection would extend north to Mary Tate Road. Mary Tate Road connects to Henry Chapel Road, which connects to Southpoint Road (NC 273).

Public Comments Received. Comments were received from two citizens on Drennan Horne Drive (a short road off of Boat Club Road) requesting a shorter route back to Southpoint Road (NC 273).

Refined Preliminary Design for the Preferred Alternative. The extension connecting Boat Club Road to Henry's Chapel Road was replaced with a shorter reconnection directly to NC 273 (Southpoint Road). The refined connection would move the existing intersection of Boat Club Road and NC 273 (Southpoint Road) approximately 500 feet north to a location outside the interchange's access control area, resulting in a shorter service road and shorter route to NC 273 (Southpoint Road) compared to the connection originally shown.

Figure 2-3n and **Appendix H**, **Figure H-6**, show the Preferred Alternative refined preliminary design in this area.

2.3.1.12 Reconfigure the I-485 and Dixie River Road Interchanges

Preliminary Design in the Draft EIS. The preliminary design for DSA 9 shown on Figures 2-9ee, gg, hh, and ii in the Draft EIS and on the Corridor Design Public Hearing Maps (April 24, 2009) includes a half-clover-leaf interchange at Dixie River Road and a system interchange at I-485.

The system interchange at I-485 maintains route continuity between the Gaston East-West Connector and I-485, with traffic desiring to continue from eastbound Gaston East-West Connector to West Boulevard exiting to the right. This interchange is near the Charlotte-Douglas International Airport (CDIA).

Public Comments Received. The NCTA has been coordinating with CDIA and the Charlotte Department of Transportation (CDOT) throughout the project development process to obtain information on projects in the area. At the time the Draft EIS preliminary designs for the DSAs were created, the CDIA was planning/constructing a third parallel runway (opened in January 2010) and had plans for an intermodal facility on the south side of the airport between the second and third runways.

CDIA and CDOT also had plans for realigning West Boulevard south of the airport and for paving the currently graded but unpaved ramps at the I-485 interchange with Garrison Road. With the exception of the runway project, project schedules were uncertain at the time the Draft EIS preliminary designs were completed.

The CDIA and CDOT projects have continued to progress, along with the Gaston East-West Connector. Coordination meetings between NCTA, NCDOT, CDIA, and CDOT were held on November 4, 2009, January 6, 2010, and January 19, 2010. The CDIA stated that the intermodal facility is scheduled to be opened in late 2011. Access to I-485 is important for the operations at the facility. To support this project, the Garrison Road interchange ramp paving project (STIP Project R-2248H) and the West Boulevard extension project (STIP Project U-3411) to connect to the interchange are scheduled to be completed prior to opening the intermodal facility.

In order to preserve the investments made in these improvements, CDIA and CDOT requested that NCTA reevaluate the I-485/Gaston East-West Connector interchange to determine the feasibility of incorporating the existing Garrison Road bridge over I-485 and a planned bridge over a Norfolk Southern (NS) railroad spur (part of the intermodal facility) and the feasibility of maintaining full access to/from I-485 and West Boulevard during construction of the Gaston East-West Connector.

Refined Preliminary Design for the Preferred Alternative. Based on the coordination with CDIA, NCDOT, and CDOT described above, the interchange at I-485 was modified for the Preferred Alternative. The modifications at this interchange also required modifications to the Dixie River Road interchange and the access roads reconnecting Garrison Road to Dixie River Road.

The interchange at I-485 was shifted north and the configuration of the ramps was modified. An access road is proposed south of the Gaston East-West Connector to connect Garrison Road to Dixie River Road. Due to the interchange shifting north and the change in property impacts, the originally proposed access road on the north side of the Gaston East-West Connector is not needed.

These interchange modifications would result in a direct impact to the Dixie Community Center located on Garrison Road just west of I-485. The community center is described in Section 3.2.2.2

of the Draft EIS. The original preliminary design would avoid taking the community center. The NCTA intends to conduct additional coordination with this community and to develop a mitigation plan for this relocation, as listed in the Special Project Commitments (**Section PC**).

Figures 2-3p-r and **Appendix H**, **Figure H-7**, show the Preferred Alternative refined preliminary design in this area.

2.3.2 SERVICE ROADS

A *Gaston East-West Connector Service Road Study* (PBS&J, May 2010) was prepared for the Preferred Alternative, and is incorporated by reference. The objective of this study was to identify parcels whose access would be eliminated by the Preferred Alternative refined preliminary design (i.e., landlocked parcels) and to evaluate the feasibility and reasonableness of providing service roads to restore access to those parcels. The recommendations in the *Service Road Study* are preliminary. Final decisions on service roads will be made during final design.

2.3.2.1 Service Road Evaluation Methodology and Design Assumptions

The refined preliminary design for the Preferred Alternative was reviewed to identify those parcels that would be landlocked with implementation of the refined preliminary design. Once the impacted parcels were identified, they were then evaluated to estimate the cost of constructing a service road to the property from existing roadways near the project. This cost was then compared to an estimate of the total acquisition cost, based on tax values, for the isolated or remnant portions of the parcel. If the cost of constructing the service road to a property (or properties) was estimated to be less than the cost of total acquisition of the property(ies), then the service road was included in the refined preliminary design.

Several factors were used in formulating approximate costs to provide service roads. These factors include the cost associated with constructing the service road, any major hydraulic structures that may be necessary, environmental mitigation costs, and additional right of way necessary to develop the service road.

In addition, design criteria were developed to guide the design of each service road. These criteria were developed to serve the land-locked parcel with safe and cost-effective access. The intended use and expected traffic volumes, including vehicle mix, were major considerations in developing the following design criteria.

Design Speed. The design speed selected for the service roads is 30 mph with an anticipated posted speed of 25 mph. These facilities are intended to be low volume roadways providing access only to local, mainly residential, properties. Some of the service roads would provide access to only one parcel, but others could potentially serve two or more adjacent parcels. Design speed adjustments were made for unusual circumstances and unique property use situations, as necessary.

Typical Section. The service road typical section consists of two 11-foot lanes with 2-foot unpaved shoulders on each side. Depending on the profile, roadside ditches would be provided to convey drainage away from the roadway facility and reduce future maintenance costs.

Alignment and Grade. The alignments of the individual service roads vary based on property configurations. Each situation was unique and treated as such to develop the best design solution. The goal was to minimize the loss of adjacent properties by paralleling the control of access portion of the facility as closely as possible. Where following the control of access was not an option or would result in an unusually long service road, the alignment typically paralleled or

straddled the property line to balance the loss of property between the adjacent parcels. The grades of the proposed service roads were dictated by existing topography to reduce earthwork.

Hydraulic/Environmental Feature Crossings. Some of the service roads cross drainage features, as well as streams and wetland areas. In these cases, efforts to avoid impacting these resources were made by adjusting the horizontal alignments and/or reducing "footprint" impacts to these environmental features to the extent possible by tightly controlling the profile and steepening side slopes as necessary through these areas.

2.3.2.2 Proposed Service Roads

Based on the analysis conducted as described above, fourteen preliminary service roads are recommended. These fourteen proposed service roads are listed in **Table 2-1** and shown in **Figure 2-3a-r**. It should be noted that the layout and design of these service roads may be modified during final design based on potential cost and material savings or to accommodate modifications requested by individual land-locked property owners.

TABLE 2-1: Recommended Preliminary Service Roads

Figure Reference	Nearest Corridor Segment	Location	Number of Parcels Served
2-3b	H2A	North of I-85	16
2-3c	H3	Northwest of US 29-74 Interchange	8
2-3c	H3	Southeast of US 29-74 Interchange	11
2-3c	H3	Southwest of US 29-74 interchange	5
2-3e	H3	Connect Parcel to Stablegate Dr. South of Penny Park Dr	1
2-3f	J4a	Connect New Haven Dr to Crowders Creek Rd	19
2-3j	JX4	Reconnect Dorchester Rd	3
2-3j	JX4	Connect Parcel to Scott Dr	1
2-3k	J1f	Reconnect Crawford Rd to NC 274 (Union Rd)	11
2-3l	K1A	Connect Parcel to Rufus Ratchford Rd	1
2-3m	K3A	Reconnect Suzanne Dr to NC 279 (South New Hope Rd)	11
2-3m	K3A	Reconnect Teakwood Dr to NC 279 (South New Hope Rd)	13
2-3p	K3C	Connect parcel southwest of Dixie River Rd interchange to Lynn Parker Ln	1
2-3p	K3C	Connect parcels on Horton Rd to Garrison Rd southwest of I-485 interchange	11

Source: *Gaston East-West Connector Service Road Study*, PBS&J, May 2010.

2.3.3 AVOIDANCE AND MINIMIZATION OF IMPACTS TO WATERS OF THE US

The refined design for the Preferred Alternative resulted in an approximate 25 percent reduction in stream impacts (2.36 miles), an approximate 6 percent reduction in wetland impacts (0.4 acre), a slight increase in impacts to ponds (0.4 acre), and a slight decrease in Catawba River buffer impacts compared to the preliminary design for DSA 9 documented in the Draft EIS. The changes in jurisdictional resource impacts resulting from the individual refinements are summarized in **Table 2-2**. **Appendix I** includes tables listing impacts by individual resource.

TABLE 2-2: Summary of Changes in Jurisdictional Resource Impacts Due to Design Refinements and Service Roads for the Preferred Alternative

Design Refinement	Change in Impact to Resource Compared to Draft EIS DSA 9 Preliminary Design*					
	Catawba River Buffers (sq ft)	Perennial Streams (linear ft)	Intermittent Streams (linear ft)	Total Streams (linear ft)	Wetlands (acres)	Ponds (acres)
Reduce Median Width	Zone 1 6,758 Zone 2 -1,356	-980	-174	-1,154	-0.32	0
Modify Matthews Acres Access	0	0	0	0	0	0
Modify Forbes Rd Grade Separation	0	-71	0	-71	0	0
Compress Robinson Rd Interchange	0	-170	0	-170	0	-0.06
Eliminate Bud Wilson Rd Interchange	0	-3,109	-646	-3,755	0	0
Compress NC 274 (Union Rd) Interchange	0	-1,823	+398	-1,425	+0.02	+0.18
Relocate Tucker Rd Connection	0	+37	0	+37	0	0
Realign Mainline At Duke Energy/Belmont Optimist Club Fields	0	-181	+6	-175	0	0
Reconfigure NC 273 (Southpoint Rd) Interchange to Avoid Cemetery	0	0	0	0	0	0
Relocate Boat Club Rd North Connection	0	-135	0	-135	0	0
Reconfigure I-485 Interchange	0	-3,783	-2,335	-6,118	-0.34	0
TOTAL CHANGE	Zone 1 -6,758 Zone 2 -1,356	**-10,215**	**-2,751**	**-12,966**	**-0.64**	**+0.12**
Impacts Reported in Draft EIS for DSA 9	Zone 1 10,400 Zone 2 10,215	38,894	10,101	48,995	7.50	4.1
Impacts for Preferred Alternative (no service roads)	Zone 1 3,642 Zone 2 8,859	28,679	7,350	36,029	6.90	4.2
Add Service Roads	0	+354	+33	+387	+0.12	+0.3
TOTAL IMPACTS FOR PREFERRED ALTERNATIVE	Zone 1 3,642 Zone 2 8,859	29,033	7,383	36,416	7.02	4.5

* Impacts calculated based on slope stake limits plus a 25-foot buffer.

2.3.4 COST ESTIMATES FOR THE PREFERRED ALTERNATIVE

Cost estimates for the Preferred Alternative are presented in **Table 2-3**. Cost estimates are based on the Preferred Alternative refined preliminary design, as described in **Sections 2.3.1** and **2.3.2**. The estimates are in year-of-expenditure dollars, as described in the table notes. Cost estimates are provided as a range of probable project costs for construction, right-of-way acquisition, and environmental mitigation (mitigation of impacts to streams and wetlands). The Total Project Cost provided represents the 70 percent confidence level. This means that there is a 70 percent probability that the cost to construct the project will be less than or equal to $943 million.

TABLE 2-3: Cost Estimates for Preferred Alternative

	Approximate Length (miles)	Probable Range of Costs Through Year of Expenditure (millions $)*				Project Cost (70% chance costs will be less)
		Construction	Environmental Mitigation	ROW & Utility	Total Cost	
Preferred Alternative	21.9	713 to 743	25 to 28	175 to 189	913 to 960	943

Source: HNTB, June 22, 2010.

Notes: * Assumptions and notes regarding costs:

1. Construction cost includes construction, utilities, engineering, and administrative costs.
2. Year of expenditure costs were modeled using a range of possible inflation rates.
3. Future construction costs were modeled to mid-point of construction using inflation rates ranging from 2.5% to 4%, with 3% being most likely.
4. Future right-of-way costs were modeled to anticipated year of acquisition using inflation rates ranging from 0% to 4%, with 2% being most likely.
5. Future administrative costs were modeled to anticipated year of expenditure using inflation rates ranging from 2.5% to 4.5%, with 4% being most likely.
6. Ranges of costs are based on cost projections in which the lowest 10% and highest 10% were discarded.
7. Year of expenditure costs assume and award date of February 2011 and an opening in December 2014.
8. Environmental mitigation costs are based on NCEEP fee schedule dated July 1, 2009 for estimated impacts to streams and wetlands and assume mitigation for impacts to all wetlands, all perennial streams, and intermittent streams with a NCDENR-DWQ stream rating greater than or equal to 26.
9. Right-of-way costs were provided by Carolina Land Acquisitions in July 2008.

A cost estimate review was held on June 14-17, 2010, that included individuals from FHWA, NCTA, and the project study team to review the cost and schedule estimates for the Preferred Alternative. The objective of the review was to verify the accuracy and reasonableness of the total cost estimate and schedule, and to develop a probability range for the cost estimate that represents the project's current stage of development. The costs provided in this table represent those costs.

In addition, prior to completing the Preferred Alternative cost estimate, an additional meeting was held to discuss factors that could influence the project's costs and the schedule. As outlined in **Section 3.2.2**, a workshop was held in August 2009 with FHWA, NCDOT, NCTA, NCWRC, NCDWQ, MUMPO, GUAMPO, the City of Gastonia, and the project study team. The purpose was to identify risks and opportunities, and to identify and evaluate context-sensitive solutions. This information was then utilized as part of the cost estimate review.

2.3.5 UPDATED TRAFFIC FORECASTS AND OPERATIONS ANALYSIS

2.3.5.1 Year 2035 Traffic Forecasts

The updated 2035 traffic forecast for the Preferred Alternative is documented in the *Gaston East West Connector Updated Traffic Forecast and Preliminary Design Traffic Capacity Analysis for the Preferred Alternative* (HNTB, May 2010), incorporated by reference. This report updates the information used in the Draft EIS from the *Proposed Gaston East-West Connector Preliminary Traffic and Revenue Forecast Final Report* (Wilbur Smith and Associates, October 12, 2006), and the *Gaston East-West Connector Traffic Forecasting and System Level Analysis for the Detailed Study Alternatives* (Martin/Alexiou/Bryson, April 2007).

Table 2-4 includes the Year 2035 traffic volumes along the Preferred Alternative. The 2035 forecast volumes along the Gaston East-West Connector are projected to be higher than the previously forecasted 2030 Toll scenario volumes based on the use of a different version of the Metrolina Regional Model (Version MRM06v1.1), updated socio-economic data, and the additional five years of traffic growth. Also, as the existing roadway network becomes more congested and

reaches or exceeds traffic capacity from 2030 to 2035, motorists would be more inclined to access the Gaston East-West Connector because this facility would remain under capacity and should allow for higher travel speeds and lower travel times than alternate routes in 2035. Given the expected increase in future congestion and delays along the I-85 corridor in the Project Study Area, it is anticipated that motorists will be more willing to travel the Gaston East-West Connector.

TABLE 2-4: Year 2035 Traffic Volumes Along the Preferred Alternative

Segment	2035 Annual Average Daily Traffic Volume
I-85 to US 29-74	21,300
US 29-74 to Linwood Road (SR 1133)	28,400
Linwood Road to US 321	23,500
US 321 to Robinson Road (SR 2416)	33,400
Robinson Road to NC 274 (Union Road)	36,400
NC 274 to NC 279 (South New Hope Road)	37,200
NC 279 to NC 273 (Southpoint Road)	53,800
NC 273 to Dixie River Road (SR 1155)	69,300
Dixie River Road to I-485	64,200
East of I-485	26,800

Source: *Gaston East West Connector Updated Traffic Forecast and Preliminary Design Traffic Capacity Analysis for the Preferred Alternative*, Prepared by HNTB, May 2010.

2.3.5.2 Traffic Operations

A traffic capacity analysis was prepared for the Preferred Alternative refined preliminary design to verify that the refined preliminary design would provide adequate capacity based on the 2035 forecast toll facility traffic volumes. The updated 2035 traffic capacity analysis is documented in the *Gaston East-West Connector (U-3321) Final Traffic Capacity Technical Memorandum 2030 Non-Toll/2035 Toll* (HNTB, February 2010) and the *Gaston East West Connector Updated Traffic Forecast and Preliminary Design Traffic Capacity Analysis for the Preferred Alternative* (HNTB, May 2010), incorporated by reference.

Based on the analysis of the Preferred Alternative refined preliminary design, all individual freeway, ramp merge, and ramp diverge locations are expected to operate at an acceptable peak hour LOS, which is defined as LOS D or better.

The ramp terminal intersections analyses for the 2035 Toll forecast traffic scenario shows that all intersections are expected to operate with acceptable LOS, with two exceptions: the intersection of US 321 and the Gaston East-West Connector eastbound off-ramp, and the intersection of Robinson Road with the westbound ramps. Based on 2035 forecasted volumes, it is recommended the laneage at the US 321/eastbound off-ramp intersection be revised from dual right-turn lanes and an exclusive left-turn lane to dual left-turn lanes with an exclusive right-turn lane. For the Robinson Road/westbound ramp intersection, a second right turn lane should be added on the westbound off ramp. Neither of these modifications would require additional right of way.

The final design laneage will be re-evaluated during the design-build process to determine the appropriate interchange and intersection designs with the updated 2035 Toll volumes.

2.4 ADDITIONAL STUDIES OF THE PREFERRED ALTERNATIVE

In addition to the design refinements, service road study, and updated traffic forecasts and operations analysis described in **Section 2.3**, several other environmental impact studies were prepared for the Preferred Alternative since the Draft EIS was published. The results of these studies, along with the design changes described in **Section 2.3**, were used in calculating updated impacts for the Preferred Alternative, as presented in **Section 2.5**. The studies cited below are all incorporated by reference into this Final EIS and are available for review and download on the NCTA Web site: www.ncturnpike.org/projects/gaston.

Traffic Noise Study Addendum. A noise study was prepared for all DSAs as part of the Draft EIS, and documented in the *Final Traffic Noise Technical Memorandum for the Gaston East-West Connector* (PBS&J, July 2008). Since that time, design modifications have been made to the DSA 9 (Preferred Alternative), and projected traffic volumes have been updated to 2035 (**Section 2.3.5**). Therefore, an updated noise study for the Preferred Alternative was prepared, as documented in the *Traffic Noise Technical Memorandum Addendum* (PBS&J, April 2010). Results of the updated study are presented in **Section 2.5.2.1**.

Hazardous Materials Study Update. An updated hazardous materials evaluation was prepared for the Preferred Alternative to investigate potentially contaminated parcels in the project corridor. The results are reported in a memorandum from the NCDOT Geotechnical Engineering Unit dated October 28, 2009, and are presented in **Section 2.5.2.6**.

Intensive Archaeological Survey. An intensive archaeological survey was conducted for the Preferred Alternative to identify archaeological resources that may be impacted. The *Intensive Archaeological Survey and Evaluation of Detailed Study Alternative 9 (Recommended Route) for the Proposed Gaston East-West Connector* (Coastal Carolina Resources, July 2010) (*Intensive Archaeological Survey*) is incorporated by reference into this Final EIS. The results of the intensive survey are presented in **Section 2.5.3.2**.

Surveys for Jurisdictional Resources and Federally Protected Schweinitz's Sunflower in Service Road and Cross-Street Areas. Some portions of the cross-street improvements shown in the Draft EIS, and some of the service roads proposed for the Preferred Alternative are located outside the original study corridor boundaries defined for the DSAs. These small areas outside the original DSA study corridor boundaries had not been surveyed for jurisdictional resources or protected plant species. Surveys were performed in these areas of the Preferred Alternative refined preliminary design in November 2009. Surveys for jurisdictional resources are documented in the *New Jurisdictional Resource Surveys for Service Roads* (PBS&J, J 2010), incorporated by reference into this Final EIS. Surveys for protected plant species are documented in a memorandum *Endangered Plant Species Surveys – Gaston East-West Connector* (PBS&J, February 12, 2010), incorporated by reference into this Final EIS.

Conceptual Mitigation Plan. A conceptual mitigation plan to address potential compensatory mitigation opportunities for impacts to Waters of the US was prepared for the Preferred Alternative. The *Conceptual Mitigation Plan for the Gaston East-West Connector* (PBS&J, June 2010) is discussed in **Section 2.5.4.4**.

Indirect and Cumulative Effects Quantitative Assessment. A quantitative indirect and cumulative effects (ICE) study was prepared for the Preferred Alternative to expand on the qualitative analysis previously prepared for the project. The *Gaston East-West Connector*

Quantitative Indirect and Cumulative Effects Analysis (Louis Berger Group, Inc., August 2010) examines potential indirect and cumulative effects in more detail for the Preferred Alternative. The *Quantitative ICE* study is summarized in **Section 2.5.5**.

2.5 IMPACTS OF THE PREFERRED ALTERNATIVE

This section presents updated impacts for the Preferred Alternative based on the studies and design refinements discussed in the previous sections. The sections below follow the same order as presented in the Draft EIS.

Existing conditions and background information on regulations and policies are included in **Chapter 1** and in the Draft EIS. For some resources, the impacts documented in the Draft EIS have not changed. These are noted where applicable and are included in this section so that all the impacts of the Preferred Alternative can be reviewed in one section.

2.5.1 HUMAN ENVIRONMENT

2.5.1.1 Land Use and Transportation Planning

The information in this section is summarized from Sections 3.1.3 and 3.1.4 of the Draft EIS, with updates on local land use plans and the GUAMPO *2035 LRTP* and the MUMPO *2035 LRTP* described in **Section 1.3.1.3**.

Consistency With Land Use and Transportation Plans. As discussed in **Section 1.3.1.1**, the Preferred Alternative would be generally consistent with local land use plans and regional, state, and local transportation plans.

Section 3.1.3 of the Draft EIS discusses the inclusion of the Gaston East-West Connector in the GUAMPO *2030 LRTP* and the MUMPO *2030 LRTP*. The project was included in both LRTPs as a regionally significant project. The only inconsistency was that the project was not shown as a toll facility. The Gaston East-West Connector is included in the updated GUAMPO *2035 LRTP* and MUMPO *2035 LRTP* as a toll facility.

Consistency with Transportation Plans

The local 2035 long range transportation plans include the Gaston East-West Connector as a toll facility.

However, there were still two inconsistencies between the Preferred Alternative and the project included in the GUAMPO 2035 LRTP. The GUAMPO *2035 LRTP* included an interchange at Bud Wilson Road, and there were different assumptions for the year 2015 configuration (**Section 2.5.2.2**). The Bud Wilson Road interchange has been eliminated from the Preferred Alternative (**Section 2.3.1.6**). Current plans are for the Preferred Alternative in 2015 to be constructed as a four-lane facility from I-485 to US 321 and as an interim two-lane facility from US 321 to I-85. The remaining two lanes for the segment from US 321 to I-85 would be constructed by 2035.

After the May 3, 2010 conformity determination made by the USDOT, the GUAMPO prepared an amendment to the *2035 LRTP* and *2009-2015 TIP* so that the project design concept and scope included in the LRTP and TIP is consistent with the Preferred Alternative. GUAMPO made a conformity determination on the amended *2035 LRTP* and *2009-2015 TIP* on August 24, 2010. USDOT issued a conformity determination on the amendments on October 5, 2010. A copy of the USDOT letter is included in **Appendix K** of this Final EIS.

Land Use. Since the DSAs, including the Preferred Alternative, are on new location, direct land use changes associated with any of the DSAs include converting the land needed for right of way from its existing use to a transportation use. The land needed for right of way includes a wide variety of uses, such as industrial, commercial, residential, recreational, agricultural, and undeveloped.

In addition to the changes that would occur due to right-of-way acquisition, other land use changes are likely due to the nature of the facility. The project also could play a role in the transition of the overall character of southern Gaston County from rural to suburban, which is consistent with the *Gaston County Comprehensive Plan*. Since this new roadway would enhance access, it would provide opportunities for increased intensity of development. More detailed information regarding potential changes in land use as a result of the Preferred Alternative is provided in the *Indirect and Cumulative Effects Quantitative Assessment* (Louis Berger Group, Inc., August 2010), as summarized in **Section 2.5.5** of this Final EIS.

2.5.1.2 Right-of-Way Acquisition and Relocations

The Preferred Alternative would require relocation of residences and businesses. In Section 3.2.3.1 of the Draft EIS, the number of relocations for DSA 9 was estimated to be 348 residences, 37 businesses, one farm, and three non-profits (two churches and an Elks lodge).

Relocations

The Preferred Alternative would relocate approximately 344 residences, 38 businesses, 1 farm, and 3 non-profits.

The refined preliminary design for the Preferred Alternative would reduce the project's footprint, resulting in four fewer residential relocations. The provision of a service road in the southeast quadrant of US 29-74 would result in one additional business relocation. Overall, the Preferred Alternative refined preliminary design is estimated to relocate approximately 344 residences, 38 businesses, one farm and four non-profits. Business relocations are concentrated along existing US 321, US 29-74, and I-85. The additional non-profit relocation is the Dixie Community Center on Garrison Road, as discussed in **Section 2.5.1.5**.

According to the Relocation Reports in Appendix C of the Draft EIS, there is comparable replacement housing and farms within the Project Study Area for displaced homeowners and tenants.

As discussed in Section 3.2.3.2 of the Draft EIS, the NCTA will follow the state and federal regulations and NCDOT policies for right-of-way acquisition and relocation. The policies ensure that comparable replacement housing is available for relocatees prior to construction of state and/or federally assisted projects. Furthermore, the NCTA will use three programs NCDOT has to minimize the inconvenience of relocation: Relocation Assistance, Relocation Moving Payments, and Relocation Replacement Housing Payments or Rent Supplement. The relocation program for the Preferred Alternative will be conducted in accordance with the federal Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Public Law 91-646) and the North Carolina Relocation Assistance Act (NCGS 133-5 through 133-18).

More information on right-of-way acquisition and relocation is available in the following two NCDOT brochures: *Answers to the Questions Most Often Asked About Right of Way Acquisitions* and *Relocation Assistance* (NCTA Web site: www.ncturnpike.org/projects/gaston/documents.asp)

2.5.1.3 Neighborhoods

Neighborhoods

Twenty-four neighborhoods would be impacted by the Preferred Alternative.

Impacts to neighborhoods from the DSAs are discussed in Section 3.2.4 of the Draft EIS and in **Section 1.3.1.4**. In the Draft EIS, DSA 9 was reported to impact 18 named subdivisions and seven rural communities (unnamed neighborhoods), a total of 25 neighborhoods.

The refined preliminary design for the Preferred Alternative resulted in changes to neighborhoods impacts, with a total of 24 neighborhoods impacted. These updated impacts to neighborhoods from the Preferred Alternative are listed in the updated matrix in **Table 2-5**.

As in the Draft EIS, impacts in the matrix are divided into areas where relocations would occur and whether access would be modified. The type of relocation effect is divided into categories "A" through "E," and the type of access effect is divided into qualifiers "1" or "2" for each impact category "A" through "E." For example, when comparing impact categories "C1" and "C2", the "C" indicates the location of impacted homes in a neighborhood, and the number ("1" or "2") following the letter denotes if there is an access change (denoted by "2") or if there is not an access change (denoted by "1"). The footnotes in **Table 2-5** describe the categories in detail.

As a result of the design refinements included with the Preferred Alternative, the potential impact category for four neighborhoods changed. In addition, one neighborhood was inadvertently not counted in the Draft EIS Table 3-5 for DSA 9, White Oak subdivision, and is now included in **Table 2-5**. These five neighborhoods are described below, from west to east.

Fall Estates. Impacts to Fall Estates changed from Category D1 to D2 because the access road to reconnect the homes in Fall Estates west of the Gaston East-West Connector changed from a bridge over the project mainline to a service road along the west side of the mainline connecting to Crowders Creek Road (**Figure 2-3f**).

Saddlewood/Pam Drive. Impacts to the Saddlewood/Pam Drive neighborhood changed from Category B2 to B1 because the connection of Pam Drive to Robinson Road that was proposed to be severed has been reinstated in the refined preliminary design (**Section 2.3.1.4**). Also, this neighborhood was counted twice in the Draft EIS for DSAs 4, 5, 9, 22, 23, 27, 76, 77, and 81 because this neighborhood is located at the junction of two Corridor Segments (J2c and J2d) and it was counted as being impacted by both segments (**Appendix A**, **Errata**).

White Oak. Impacts to the White Oak neighborhood, on Dorchester Road, were inadvertently not counted for Corridor Segment JX4 in the Draft EIS (DSAs 5, 9, 23, 27, 77, and 81) (**Appendix A**). The Preferred Alternative would impact the homes on the northeast side of Dorchester Road.

N17 - Wilmot Trail. Impacts to unnamed neighborhood N17, the cluster of residences on Wilmot Trail west of Bud Wilson Road, changed from Category C2 to Category A (No Impact) because the Bud Wilson Road interchange has been eliminated (**Section 2.3.1.5**) and the proposed right of way was reduced in this area.

TABLE 2-5: Potential Neighborhood Impacts

Affected Neighborhood (from west to east)	Preferred Alternative Type of Effect
Named Neighborhoods	
Brookhaven	B2
Edgewood Acres	A
Erskine Woods	A
Matthews Acres	C2
Spring Valley	C2
Myrtle Mill	A
Lakewood Forest	C2
Stablegate Farms	C2
Fall Estates (*was D1 in Draft EIS*)	D2
Levi's Mobile Home Park	E
Orion Oaks MHP No. 1	D2
Orion Oaks MHP No. 2	D2
Orion Oaks MHP No. 3	D2
Orion Oaks MHP No. 4	D2
Charleston	A
Forbes Cove	B1
Brittany Woods	C1
Wesley Acres	C1
Saddlewood/Pam Drive (*was B2 in Draft EIS*)	B1
White Oak (*was not counted for DSA 9 in Draft EIS*)	C1
Forest Pointe	A
Brook Forest/South Forest	C1
Joye Mobile Home Park	D2
Unnamed Neighborhoods	
N2 Located west of Stagecoach Rd south of Linwood Rd	C1
N3 located west of Stagecoach Rd south of Linwood Rd	C1
N17 located west of Bud Wilson Rd (*was C2 in Draft EIS*)	A
N7 located on Union Rd south of Union New Hope Rd	C2
N11 located on Dixon Rd east of NC 279	B2
N12 located off of NC 273 (Southpoint Rd)	D2
N16 located along Garrison Rd east of Dixie River Rd (*was D2 in Draft EIS*)	C2
Total Number of Category B Impacts	4
Total Number of Category C Impacts	11
Total Number of Category D Impacts	8
Total Number of Category E Impacts	1
Total Number of Neighborhood Impacts	**24**

Based on refined preliminary design for the Preferred Alternative, February 2010.

TYPE OF EFFECT (Letter denotes type of direct impact. Number denotes access change):

A – No impact.

B1 – No relocations, but right-of-way encroachment and existing access maintained.

B2 – No relocations, but change in access (could include ROW encroachment).

C1 – Relocation of homes on end of road or at edge of neighborhood.

C2 – Relocation of homes on end of road or at edge of neighborhood and change in access.

D1 – Relocation of homes in midst of neighborhood.

D2 – Relocation of homes in midst of neighborhood and change in access.

E – Total displacement of a neighborhood.

N16 – Garrison Road. The impact category for the Garrison Road community (Neighborhood N16) changed from Category D2 to C2. The interchange has been shifted north, as described in **Section 2.3.1.12**. The new interchange design would relocate homes at the north end of Garrison Road, instead of in the midst of the neighborhood. An extension of Garrison Road west to Dixie River Road would provide access to the remaining homes south of the Gaston East-West Connector. However, the refined preliminary design would displace the Dixie Community Center, also located at the north end of Garrison Road (**Section 2.5.1.5**).

The most impacts to neighborhoods would occur in the area between I-85 and US 321. This area is relatively highly developed, and there are numerous other constraints, such as Crowders Creek and its floodplain and Crowders Mountain State Park. Designing an alternative that would not impact existing development was not possible.

A planned future subdivision with a site plan approved by the City of Gastonia also could be impacted by the Preferred Alternative. The Presley development, located north of the intersection of NC 274 (Union Road) and Union New Hope Road near Forestview High School, is partially located within Corridor Segments J1e and J1f. The preliminary design for the Preferred Alternative may have minor encroachments on the areas of the site plan labeled for a future commercial village.

Indirect effects could occur to neighborhoods under the Preferred Alternative (as well as the other DSAs). The project could accelerate land use changes to non-residential uses, causing changes in the character of neighborhoods.

2.5.1.4 Environmental Justice

There have been no updates to environmental justice information since the Draft EIS was published. Based on information presented in Section 3.2.5 of the Draft EIS and **Section 1.3.1.5**, the construction of the Preferred Alternative was determined not to have a disproportionately high and adverse impact on minority and low income populations.

2.5.1.5 Community Resources and Services

Community resources and services in the project study area include churches, cemeteries, schools, fire stations, libraries, community centers, parks, and private recreation areas. There are no hospitals within or adjacent to the DSAs.

Churches and Cemeteries. There is no change in impacts to churches since the Draft EIS was published, but there is an update to impacts to cemeteries.

The Preferred Alternative would impact three church properties and one cemetery, as shown in **Table 2-6**. Two churches, St. Titus AME Zion Church and Charity Independent Baptist Church, would need to be relocated. An outbuilding on the third church property, Broomfield Methodist Church, would be impacted.

TABLE 2-6: Church and Cemetery Impacts from Preferred Alternative

Name and Location	Preferred Alternative Segment	Buildings Taken?	Parcel Size in Acres (% Taken)	Notes
St. Titus AME Zion 437 Shannon Bradley Rd, Gastonia	H2A	No	1.4 (70%)	Construction would not take main church building, but due to amount of right of way required, relocation of the church would be necessary.
Broomfield Methodist (Carolina Conf. Christian Meth. Episcopal Church, Inc.) 937 Shannon Bradley Rd, Gastonia	H2A	Yes	17.6 (46%)	Medium-size building in back of property would be impacted. Main church building would not be impacted. Relocation of church not anticipated.
Charity Independent Baptist 2425 Hillmont St, Gastonia	H3	Yes	8.9 (60%)	Main church building would be impacted and relocation of church would be necessary.
Mt. Pleasant Baptist Church Cemetery. South side of Tucker Rd near Southpoint Rd, Belmont	JX4	NA	2.1 (14%)	Wooded area adjacent to NC 273 (Southpoint Rd) and southeast side of property would be impacted. Approximately 0.3 acres of right of way is needed. Area of current cemetery with gravestones, and historic boundaries with gravestones would not be impacted.

The Mt. Pleasant Baptist Church Cemetery is located in the northwest quadrant of the proposed interchange of the Gaston East-West Connector and Southpoint Road (NC 273). During the intensive archaeological survey for the Preferred Alternative (**Section 2.5.3.2**), gravesites with headstones were discovered south of the Mt. Pleasant Baptist Church Cemetery's present-day parcel boundaries. The historic boundaries of the cemetery were larger, and encompassed approximately an additional one-half acre to the southwest (*Intensive Archaeological Survey and Evaluation of Detailed Study Alternative 9 (Recommended Route) for the Gaston East-West Connector*, Coastal Carolina Research, July 2010).

As discussed in **Section 2.3.1.10**, the refined preliminary design reconfigures this quadrant of the interchange from a loop and ramp to a compressed ramp. This modification would avoid the historic boundary of the cemetery where the gravesites were found and would reduce the right of way needed from the present-day cemetery property. Approximately 0.3 acres of right of way would still be required from the undeveloped wooded parcel adjacent to NC 273 owned by the Mt. Pleasant Baptist Church, but no gravesites were found in this location.

All applicable state and local regulations and requirements for relocating or mitigating the impact to cemeteries will be met.

Schools. The only school within or adjacent to the Preferred Alternative study corridor is Forest Heights Elementary at 2500 Sedgefield Drive in Gastonia (Corridor Segment H3). This school is just outside the corridor boundaries. The Preferred Alternative refined preliminary design would not require land from this school, nor would it directly impact any school facilities.

At the time the Draft EIS was prepared, a potential new middle/high school campus location in Corridor Segment K2A or K3A was being researched by Gaston County Schools. However, since the Draft EIS was published, potential school sites within the study area have been eliminated from consideration by Gaston County Schools (Telephone interview, Executive Director, Auxiliary Services for Gaston County Schools, January 28, 2010).

Construction of the Preferred Alternative would temporarily impact school bus routes during construction, as well as result in modifications of existing routes and/or promote new bus routes. Prior to construction, the NCTA will coordinate/initiate discussions with Gaston County Schools and Mecklenburg County Public Schools regarding minimizing impacts to school bus routes.

Fire Stations. There is an update to fire station locations since the Draft EIS. The Crowders Mountain South Volunteer Fire Department previously located at 4802 York Highway (US 321) in Gastonia (Station F3 on Draft EIS Figure 3-7a) was just south of the Preferred Alternative study corridor. This station is no longer in operation (Telephone interview, Gaston County Fire Marshal's office, May 26, 2010). However, implementation of the Preferred Alternative may require re-routing of existing service routes during construction. NCTA will coordinate with the Gaston County Fire Marshal's office to ensure continuation of emergency services during construction.

Libraries/Community Centers. There is one library and one community center in the vicinity of the Preferred Alternative. The existing Union Road Branch Library would not be impacted by the Preferred Alternative.

The Dixie Community Center, a meeting place for the Garrison Road/Dixie River Road community, is located at 9814 Garrison Road in Charlotte, just west of I-485 (**Figure 2-3p**), within the Preferred Alternative study corridor.

As discussed in Section 3.2.2.2 of the Draft EIS, the community center is an important forum that provides a location and opportunities for interaction among existing and former residents of the Garrison Road/Dixie River Road area. The construction of I-485 and expansion of the Charlotte-Douglas International Airport in this area has split and reduced the extent of this neighborhood. The Preferred Alternative would further impact this community.

The preliminary designs for the DSAs shown in the Draft EIS would not displace the Dixie Community Center. However, the Preferred Alternative refined preliminary design would displace the community center. The reasons for modifying the Preferred Alternative design in the I-485 interchange area are discussed in **Section 2.3.1.12**. The reasons are applicable to all the DSAs.

The NCTA recognizes the importance of the Dixie Community Center to the Garrison Road/Dixie River Road community and intends to conduct additional coordination with the community and provide mitigation for the loss of this facility. This is listed as a Special Project Commitment in **Chapter PC**. The Garrison Road Community Center is a registered non-profit and would be eligible for all the benefits for non-residential relocatees under the NCDOT's relocation assistance program described in **Section 2.5.1.2**. Benefits would include, but not be limited to, advisory services to identify replacement sites, moving costs, and reestablishment expenses.

Parks and Recreation Areas. Publicly and privately-owned facilities/areas are described in Section 3.2.2.3 of the Draft EIS. Those near or within the Preferred Alternative study corridor include the publicly-owned Berewick Regional Park, the privately-owned Carolina Speedway and the privately-owned Duke Energy Corporation/Belmont Optimist Club recreational fields. These are discussed below, along with planned greenways.

Parks and Recreation Areas

The Preferred Alternative refined preliminary design avoids direct impacts to Berewick Regional Park and the Duke Energy/Belmont Optimist Club Recreation Fields. Impacts to operations at the Carolina Speedway are minimized.

Berewick Regional Park. The Preferred Alternative refined preliminary design modified the I-485 interchange and shifted it northward; and the new proposed right of way would not encroach on Berewick Regional Park (**Figure 2-3p-r**).

Carolina Speedway. Approximately 7.7 acres of the northern and western sides of this privately-owned speedway property would be impacted by the DSA 9 preliminary design shown in the Draft EIS. As discussed in **Section 2.3.1.7**, the preliminary design for the Preferred Alternative was altered by shifting the mainline alignment northward and changing the interchange from a half-clover-leaf to a compressed diamond. These design modifications would minimize impacts to operations at the Carolina Speedway. The pit area, which has been identified as important to event operations, would not be impacted (**Figure 2-3k**).

Duke Energy Corporation/Belmont Optimist Club Recreational Fields. The preliminary design for DSA 9 shown in the Draft EIS would impact the recreational ball fields owned by Duke Energy Corporation and leased by the Belmont Optimist Club. These privately-owned recreational fields encompass approximately 4.9 acres. The Draft EIS preliminary design for DSA 9 would impact the edge of the baseball field's outfield and the north corner of a football field (previously a general recreational field). No access road was shown to these recreational fields in the Draft EIS preliminary designs.

As discussed in **Section 2.3.1.9**, the preliminary design for the Preferred Alternative was altered to shift the mainline slightly northward. The Duke Energy Corporation/Belmont Optimist Club recreational fields would be avoided, as well as two electric transmission towers. Access to the Duke Energy Corporation/Belmont Optimist Club recreational fields and other landlocked properties in the southeast quadrant of the project's interchange with Southpoint Road (NC 273) would be provided by constructing a new access roadway from Southpoint Road north and east to Boat Club Road (**Figure 2-3n**).

Planned Greenways. Planned greenways are shown in Figure 3-8a–b in the Draft EIS. Both private groups (Carolina Thread Trail led by the Catawba Lands Conservancy) and public entities (GUAMPO) are planning a system of greenway trails in the area and/or region. Preferred Alternative Corridor Segments H2A, H3, and J4b have the potential to cross greenways that have yet to be constructed. Although both greenway plans are conceptual at this time, there is the potential for several greenway crossings along the Preferred Alternative, particularly west of US 321. During final design of the Preferred Alternative, NCTA will coordinate with these groups to identify needed accommodations for any existing and funded greenways that cross the Preferred Alternative. This is included as a special project commitment in **Chapter PC**.

2.5.1.6 Community Safety

Emergency Response. As stated in Section 3.2.6.2 of the Draft EIS, the Gaston East-West Connector would have a long-term positive impact on emergency response times within the Project Study Area. The project is likely to quicken some response times for services by decreasing travel times, and by providing improved east-west connectivity in southern Gaston County.

Pedestrians and Bicycles. The proposed project does not include pedestrian and bicycle provisions since it is a controlled-access freeway. However, the bridge over the Catawba River will be designed so as not to preclude future accommodation of a pedestrian/bicycle facility funded by others, such as local jurisdictions.

As noted in Section 3.2.2.3 of the Draft EIS, one of Gaston County's bicycle routes (Route 1: High Shoals – Crowders Mountain) runs east-west through the area along Linwood Road, and crosses Corridor Segments H1A, H2C and H3 (i.e., all of the DSAs). As such, the Preferred Alternative may impede or block pedestrian and bicycle traffic desiring to travel from one side of the highway to the other, because travel over/under the roadway would only be possible at interchanges and grade-separated crossings. For established and planned bicycle routes, NCTA will coordinate with MUMPO and GUAMPO to accommodate these facilities where appropriate.

Maintenance of Traffic During Construction. Maintenance of traffic and sequencing of construction would be planned and scheduled in order to minimize traffic delays throughout the Project Study Area. Signs would be used (as appropriate) to provide notice of road closures and other pertinent information to the traveling public. The local news media would be notified in advance of road closings and other construction-related activities that could excessively inconvenience the public. Access to all businesses and residences would be maintained to the extent possible through controlled construction scheduling.

Truck traffic in the Project Study Area would increase during construction. If access to construction staging areas and the construction site requires temporary access roadways, a traffic plan would be developed during the final engineering design phase to define designated truck routes and parking areas for construction vehicles.

If there are places where pedestrian travel would be temporarily impeded by the work zone (e.g., in the case of an off-site traffic detour) consideration must be given to whether or not a work zone pedestrian detour is necessary. This would be included as part of the traffic control plan developed during final design of the Preferred Alternative.

Fog. Dense fog may occur at certain times of the year along the major rivers in the Project Study Area, including the Catawba River and the South Fork Catawba River. NCTA and NCDOT do not have a written policy regarding procedures for designing projects in fog-prone areas. However, projects are studied on a case-by-case basis, typically after a project has been constructed. For example, NCDOT evaluated the conditions on the I-95 bridge over the Roanoke River near Roanoke Rapids. In this location, NCDOT installed a weather station to assess weather conditions, such as fog, and to prompt a variable message sign warning travelers of thick fog and limited visibility. Additional devices used to enhance safety in fog-prone areas can include reflective pavement markers and lighting. In accordance with NCDOT normal operating procedures, fog-related safety issues would be evaluated on a case-by-case basis after construction, and measures installed where warranted.

2.5.2 PHYSICAL ENVIRONMENT

2.5.2.1 Noise

As a result of the design changes described in **Section 2.3** and the new forecast year of 2035, an updated noise analysis was prepared for the Preferred Alternative (*Traffic Noise Technical Memorandum Addendum*, PBS&J, April 2010), incorporated by reference.

Analysis Methodology. The evaluation and modeling methodology used in the *Traffic Noise Technical Memorandum Addendum* (PBS&J, April 2010) is the same as that used in the *Final Traffic Noise Technical Memorandum for the Gaston East-West Connector* (PBS&J, July 2008), as summarized in Section 4.1 of the Draft EIS. The FHWA Noise Abatement Criteria and NCDOT policies described in Section 4.1.2 of the Draft EIS are the same.

Year 2035 Noise Contours. The FHWA Traffic Noise Model (TNM), Version 2.5, was used to develop year 2035 noise contours along the mainline of the Preferred Alternative. **Appendix J** of this Final EIS includes the updated 2035 noise contour maps for the Preferred Alternative.

Traffic volumes along the Gaston East-West Connector forecasted for 2035 are greater than the volumes forecasted for 2030 used to create the 2030 noise contours shown in Appendix G of the Draft EIS. However, the median width was reduced, as well as the pavement width, and both these factors act to reduce the noise contour distances. Therefore, changes in the noise contour distances were not as great as might be expected.

Table 2-7 lists the updated year 2035 traffic noise contours and the numbers of receptors predicted to be impacted by noise in each Activity Category (see table footnote for definitions). As listed in the table, there are 38 additional impacted receptors (for a total of 283 impacted receptors) based on the updated analysis compared to the 245 impacted receptors reported for DSA 9 in the Draft EIS (Table 4-4).

TABLE 2-7: 2035 Noise Contours and Impact Summary – Preferred Alternative

Mainline Segment	Leq Noise Levels (dBA)[1]			Maximum Contour Distances (ft)[2]		Approximate Number of Impacted Receptors By Category[3]				
	50 ft	100 ft	200 ft	72 dBA	67 dBA	A	B	C	D	E
I-85 to US 29-74	75	72	67	130	245	0	46	1	0	0
US 29-74 to Linwood Rd	76	73	69	150	270	0	11	0	0	0
Linwood Rd to US 321	75	72	68	140	260	0	52	0	0	0
US 321 to Robinson Rd	77	74	70	170	290	0	38	2	0	0
Robinson Rd to NC 274	78	75	71	190	305	0	30	0	0	0
NC 274 to NC 279	77	74	70	180	300	0	6	0	0	0
NC 279 to NC 273	78	76	71	215	330	0	52	0	0	0
NC 273 to Dixie River Rd	80	77	73	260	400	0	43	1	0	0
Dixie River Rd to I-485	80	77	73	260	390	0	1	0	0	0
East of I-485	76	73	68	145	260	0	0	0	0	0
					TOTAL	0	279	4	0	0

1. Distance from center of nearest travel lanes.
2. Distances are from the roadway centerline.
3. Activity categories are defined in the FHWA Noise Abatement Criteria (23 CFR 772). Activity Category A - lands on which serenity and quiet are of extraordinary significance. Activity Category B – Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, church, libraries, and hospitals. Activity Category C – Developed lands and properties not included in Categories A and B. Activity Category D – Undeveloped lands. Activity Category E – Interiors of residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals and auditoriums.

Barrier Evaluation Areas. As described in Section 4.1.6 of the Draft EIS, the noise sensitive sites predicted to be impacted by traffic noise (i.e., experience noise levels that approach or exceed the FHWA Noise Abatement Criteria or show a substantial increase over existing levels) that were not considered isolated sites were further reevaluated in terms of the feasibility and reasonableness of providing noise barriers.

The *Traffic Noise Technical Memorandum Addendum* (PBS&J, April 2010) focused on reevaluating areas where design changes occurred that could affect the noise analysis, and also where additional potentially impacted receptors were added as a result of the changes to the preliminary design or increase in noise contour distances.

No areas were identified where increases in noise contours added enough sensitive receptors to warrant a new detailed barrier evaluation.

Noise barriers recommended in the Draft EIS were reviewed to identify preliminary noise barrier locations where the preliminary design was refined for the Preferred Alternative and the originally recommended noise barrier would no longer be applicable. **Figure 1-6a-b** shows the preliminary noise barrier locations for the DSAs included in the Draft EIS. Two areas were identified for updated detailed barrier evaluations. These were the NC 273 (Southpoint Road) interchange area (Barriers 29-1 and 29-2) and the I-485 interchange area (Barrier 33-1).

As discussed in **Sections 2.3.1.9** and **2.3.1.10**, the Preferred Alternative preliminary design was refined in the area of the NC 273 (Southpoint Road) interchange. In the northwest quadrant of the interchange, the design changes results in eight existing residences on Tucker Road being added as sensitive receptors. The barrier proposed for this area, Barrier 29-1, was updated and found to be preliminarily reasonable and feasible.

In the northeast quadrant of the interchange, no additional noise sensitive receptors were identified. The updated preliminary Barrier 29-2 is longer and would benefit more receptors (22 versus 9) than the preliminary Barrier 29-2 recommended in the Draft EIS.

As discussed in **Section 2.3.1.11**, the Preferred Alternative preliminary design at I-485 was substantially changed. The mainline was shifted northward and the interchange configuration was modified. Preliminary Barrier 33-1 was recommended in this area based on the Draft EIS preliminary designs. Twenty-four residences were included in this barrier evaluation area. The refined preliminary design for the Preferred Alternative shifted the project farther away from these residences and only one receptor was identified as being potentially impacted by noise based on the updated evaluation. Because this is an isolated receptor, noise abatement does not need to be considered in this location.

Table 2-8 lists the updated preliminary feasible and reasonable noise barriers for the Preferred Alternative. These preliminary barriers are shown on **Figure 2-4a-b**. Eleven barriers have been preliminarily recommended, at a total preliminary cost of $4,527,690. Approximately 175 receptors would be benefited. A Design Noise Study will be prepared for the Preferred Alternative during final design. The Design Noise Study will update the noise analysis and feasibility and reasonableness of noise barriers based on updated design and traffic forecast information and the latest noise abatement regulations and policies.

Preliminary Noise Barriers

Preliminary noise barriers are recommended at 11 locations along the Preferred Alternative refined preliminary design. These may be changed or eliminated in the Design Noise Study that will be prepared during final design.

It should be noted that FHWA published a final rule updating their Procedures for Abatement of Highway Traffic Noise and Construction Noise (23 CFR Part 772) on July 13, 2010 (FHWA Web site: www.fhwa.dot.gov/environment/noise/regulations_and_guidance). The final rule requires each State DOT to revise its noise policy to be in accordance with this final rule. States must submit their revised noise policy to FHWA for approval by January 13, 2011. The NCDOT is in the process of updating their Traffic Noise Abatement Policy, which may change the criteria by which noise barriers are determined feasible and reasonable.

The Design Noise Study will be conducted in accordance with the new regulations and policies in effect at the time the study is conducted. As such, a result of the Design Noise Study could be that some preliminary noise barriers are changed or eliminated.

TABLE 2-8: Preliminary Feasible and Reasonable Noise Barriers for the Preferred Alternative

Prelim. Barriers[1]	Segment	Description	Average dBA Reduction for Benefited Receptors	Number of Benefited Receptors	Barrier		Cost	Cost Per Receptor / Allowable Cost per Receptor
					Length (ft)	Height (ft)[2]		
1-1	H2A	North of US 29-74, westbound side of alignment. Brookhaven and Spring Valley subdivisions.	9	34	2,640	12	$475,200	$13,976 / $40,824
4-1	H3	East of Linwood Springs Golf Course, at Linwood Rd, on westbound side of alignment. Lakewood Forest subdivision.	9	16	1,605	20	$481,500	$30,094 / $41,188
7-1	H3	South of Linwood Rd on the westbound side of alignment. Stablegate Farms subdivision.	8	11	1,500	16	$360,000	$32,727 / $41,909
12-1	J4A	North of Crowders Creek Rd north of New Haven Dr, westbound side of alignment. Falls Estates subdivision.	5	4	600	10	$90,000	$22,500 / $40,000
12-2	J4A	North of Crowders Creek Rd, south of New Haven Dr, westbound side of alignment. Falls Estates subdivision.	8	6	1,395	12	$251,100	$41,850 / $44,000
17-1	J4A	East of US321, westbound side of alignment. Charleston subdivision.	7	8	1,092	12/ 14	$224,760	$28,095 / $38,188
17-2	J2C	East of US321, westbound side of alignment. Forbes Cove subdivision.	8	11	1,558	10/ 12/ 16/ 14	$316,860	$28,805 / $38,818
17-3	J2C	East of US321, westbound side of alignment. Wesley Acres subdivision.	7	16	2,306	12/ 14/ 12/ 10	$393,600	$24,600 / $42,125
17-4	J2C	West of Robinson Rd, eastbound side of alignment. Pam Dr subdivision.	7	16	1,949	10/ 12/ 14/ 12	$368,280	$23,018 / $42,969
29-1	K3A	Northwest of NC273/Gaston interchange westbound side of alignment. Brook Forest subdivision.	6	31	3,760	14/16/ 18/20/ 18/16/ 14	$893,010	$28,807 / $39,597
29-2	K3B	Northeast of NC273/Gaston interchange westbound side of alignment.	7	22	2,460	20/18	$673,380	$30,608 / $43,636

Source: *Final Traffic Noise Technical Memorandum for the Gaston East-West Connector* (PBS&J, July 2008) and *Traffic Noise Technical Memorandum Addendum* (PBS&J, April 2010).

Notes: 1. The determination of feasibility and reasonableness is preliminary and subject to change based on final design, building permits issued as of the Date of Public Knowledge, and the public involvement process. 2. Barrier height varies as indicated. For example, "18/16/14" means that barrier has an 18-ft section, 16-ft section, and 14-ft section.

2.5.2.2 Air Quality

Air quality issues addressed in Section 4.2 of the Draft EIS and **Section 1.3.2.2** include transportation conformity, mobile source air toxics (MSATs), potential air quality impacts from construction activities, and potential icing from Allen Steam Station air pollution control equipment. As noted in **Section 1.3.2.2** and discussed below, there have been updates to transportation conformity and MSATs since the Draft EIS was published. A discussion of greenhouse gas emissions and climate change also has been added to this section and **Section 3.3.2.4**.

Transportation Conformity Update. The Draft *Conformity Analysis and Determination Report for the Cabarrus-Rowan MPO, Mecklenburg-Union MPO, and the Gaston Urban Area MPO 2035 Long Range Transportation Plans and the FY 2009-2015 Transportation Improvement Programs and for Non-MPO Areas of Lincoln County, Iredell County, Gaston County, and Union County areas (8-Hour Ozone, and CO (Mecklenburg County Only))* was made available for public review on February 5, 2010. Public meetings to solicit comments on these documents as well as the Draft *2035 LRTP* and the *2009-2015 STIP Amendment* were held on February 24, 2010 in the Charlotte Mecklenburg Government Center, on February 17, 2010 in the Gaston County Main Library, and other locations in the region.

All of the above referenced documents were made available for review until the close of the public review and comment period on March 8, 2010. As of that date, no substantive comments were received and all were endorsed by the MUMPO TCC on March 11, 2010, by MUMPO on March 24, 2010, by GUAMPO TCC on March 10, 2010, and by GUAMPO on March 23, 2010. USDOT made a conformity determination on the LRTP and TIP on May 3, 2010. A copy of this letter, along with USEPA's April 22, 2010 review, can be found in **Appendix K** of this Final EIS.

However, there were still two inconsistencies between the Preferred Alternative and the project included in the GUAMPO 2035 LRTP. The GUAMPO *2035 LRTP* included an interchange at Bud Wilson Road, and there were different assumptions for the year 2015 configuration (**Section 2.5.2.2**). The Bud Wilson Road interchange has been eliminated from the Preferred Alternative (**Section 2.3.1.6**). Current plans are for the Preferred Alternative in 2015 to be constructed as a four-lane facility from I-485 to US 321 and as an interim two-lane facility from US 321 to I-85. The remaining two lanes for the segment from US 321 to I-85 would be constructed by 2035.

After the May 3, 2010 conformity determination made by the USDOT, the GUAMPO prepared an amendment to the *2035 LRTP* and *2009-2015 TIP* so that the project design concept and scope included in the LRTP and TIP is consistent with the Preferred Alternative. GUAMPO made a conformity determination on the amended *2035 LRTP* and *2009-2015 TIP* on August 24, 2010. USDOT issued a conformity determination on the amendments on October 5, 2010. Copies of the USDOT letter are included in **Appendix K** of this Final EIS.

Mobile Source Air Toxics Impact Analysis Update. An updated MSAT guidance document was published by FHWA in September 2009, *Interim Guidance Update on MSAT Analysis in NEPA Documents*. This update does not change any project analysis thresholds, recommendations, or guidelines. Therefore, the qualitative impact evaluation conclusions described in Section 4.2.5.2 of the Draft EIS and Appendix H (Mobile Source Air Toxics – Discussion of Impacts) of the Draft EIS do not change. However, the interim guidance update did recommend updated language for incomplete and unavailable information and provided information on new research.

Air toxics analysis is a continuing area of research. While much work has been done to assess the overall health risk of air toxics, many questions remain unanswered. In particular, the tools and techniques for assessing project-specific health outcomes as a result of lifetime MSAT exposure remain limited. These limitations impede the ability to evaluate how the potential health risks posed by MSAT exposure should be factored into project-level decision-making within the context of NEPA.

Nonetheless, air toxics concerns continue to be raised on highway projects during the NEPA process. Even as the science emerges, FHWA is duly expected by the public and other agencies to address MSAT impacts in environmental documents. The FHWA, USEPA, the Health Effects Institute, and others have funded and conducted research studies to try to more clearly define potential risks from MSAT emissions associated with highway projects. The FHWA will continue to monitor the developing research in this emerging field.

While this research is ongoing, FHWA requires each NEPA document to address MSATs and their relationship to the specific highway project through a tiered approach (*Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA Documents*, September 30, 2009). An updated qualitative analysis of MSATs for this project, based on the updated MSAT Guidance from FHWA, appears in its entirety in **Appendix D** of this Final EIS. The findings of this analysis are summarized below.

As discussed in **Appendix D**, there may be localized areas where VMT would increase, and other areas where VMT would decrease. Therefore, it is possible that localized increases and decreases in MSAT emissions may occur along the Preferred Alternative. The localized increases in MSAT emissions would likely be most pronounced along the new roadway sections that would be built where there are few major roadways and little industry, such as the area west of US 321 and south of Linwood Road, and the area west of Daniel Stowe Botanical Garden. However, even if these increases do occur, they will be substantially reduced in the future as the implementation of EPA's vehicle and fuel regulations improves the region's fleet of motor vehicles.

As discussed in Section 2.3.1.4 of the Draft EIS, schools and hospitals were mapped and avoided where possible in the development of all the DSAs. The alignment of the Preferred Alternative is within two miles of Sadler Elementary, Forest Heights Elementary, and Forestview High School/WA Bess Elementary. There are no hospitals nearby. Sadler Elementary (1 mile from the alignment) and WA Bess Elementary (.85 mile from the alignment) are the furthest from the Preferred Alternative, and therefore have the least potential to be affected by MSAT emissions. The nearest school to the Preferred Alternative is Forest Heights Elementary School (1,000 feet from roadway centerline). Forestview High School is located one half-mile from the Preferred Alignment centerline.

In summary, it is expected that there would be higher MSAT emissions in the immediate project area, relative to the No-Build Alternative, due to increased VMT. In comparing the DSAs, MSAT levels could be slightly higher in some locations than others, but current tools and science are not adequate to quantify them or the risks to human health. However, on a regional basis, EPA's vehicle and fuel regulations, coupled with fleet turnover, will over time cause substantial reductions that, in almost all cases, will cause region-wide MSAT levels to be significantly lower than today.

Construction Air Quality. Provided that local ordinances for open burning and dust are followed, significant air quality impacts due to construction of the Preferred Alternative are not anticipated. The proposed project would be constructed in phases, limiting the overall construction activity occurring at any one location. There would also be emissions related to

construction equipment and vehicles. However, impacts related to construction would be temporary.

Road and Bridge Icing Potential from Allen Steam Station Air Pollution Control Equipment. Duke Energy Corporation's Allen Steam Station, a major coal-fired power plant, is located between NC 273 (Southpoint Road) and the Catawba River on the Belmont peninsula (Draft EIS Figure 2-8a).

The Allen Steam Station has installed air pollution control equipment to comply with the North Carolina Clean Smokestacks Act of 2002. The Allen Steam Station air pollution control equipment is located north of the main power plant, just south of Corridor Segments K3B/K3C.

The air pollution control equipment includes scrubbers for sulfur dioxide control that will emit steam through a tall stack. In correspondence with NCTA, Duke Energy Corporation raised concerns that the steam emitted from the stack could result in icing on the nearby proposed roadway and the associated bridge crossing of the Catawba River (Telephone Interview, Duke Energy Regional Manager, September 14, 2005).

In response to this concern, a study was conducted to evaluate the likelihood and extent of potential icing on the proposed roadways and bridge crossings of the Catawba River for Corridor Segments K3B/K3C (DSAs 4, 9, 22, 27, 58, 68, 76, and 81) and Corridor Segment K4A (DSAs 5, 23, 64, and 77) (*Analysis of Potential Icing Impacts Due to Allen Steam Station SO_2 Scrubber – Gaston East-West Connector,* MACTEC, September 2008, incorporated by reference).

The model predicted there would be no potential for icing on the proposed Gaston East-West Connector due to exhaust gases released from the air pollution control scrubber stack.

Greenhouse Gas Emissions and Climate Change. The issue of greenhouse gas emissions and their effects on global climate is an important national and global issue, in which FHWA is actively engaged. FHWA has been working with other Federal agencies, including the USEPA and the Department of Energy, to evaluate effective approaches consistent with our national goals. However, no national approach has yet been set in law or regulations, nor has the USEPA established criteria or thresholds for greenhouse gas emissions. Because a national strategy to address greenhouse gas emissions from transportation – and all other sectors – is still being developed, FHWA believes that it is premature to implement policies that attempt to incorporate consideration of greenhouse gas emissions into transportation planning.

From a NEPA perspective, it is analytically problematic to conduct a project-level cumulative effects analysis of greenhouse gas emissions on a problem that is global in nature. It is technically unfeasible to accurately model how negligible increases or decreases of CO2 emissions at a project scale would add or subtract to the carbon emissions from around the world. Given the level of uncertainty involved, the results of such an analysis would not be likely to inform decision-making at the project level, while adding considerable administrative burdens to the NEPA process. The scope of any such analysis, with any results being purely speculative, goes far beyond the disclosure of impacts needed to make sound transportation decisions. FHWA believes this approach meets the stated purpose of NEPA, in accord and with CEQ regulations, to concentrate on the analyses of issues that can be truly meaningful to the project decision, rather than simply amassing data.

2.5.2.3 Farmland

Prime and Important Farmland Soils and the Farmland Protection Policy Act. The US Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) has updated the lists of prime and other important farmland soils for Gaston and Mecklenburg Counties since the Draft EIS was published, as described in **Section 1.3.2.3**. Soils within the right of way for the Preferred Alternative considered by the NRCS to be prime or of statewide importance are listed in **Table 1-3** and mapped in **Appendix E**. There are no farmland soils classified as unique or locally important within the right of way for the Preferred Alternative.

Construction of the Preferred Alternative would involve the use of prime and statewide important farmland soils. **Table 2-9** presents the acreages of prime and statewide important farmland soils within the refined preliminary design right of way for the Preferred Alternative, including the proposed service roads. The acreages were calculated using GIS by overlaying the refined preliminary design right of way on the soils GIS layer and subtracting disturbed land (land already in urban development).

TABLE 2-9: Impacts to Prime and Important Farmland Soils

	Total Acreage in Right of Way	Prime Farmland Soils	Statewide Important Farmland Soils	Prime and Important Farmland Soils	
		Acres in Right of Way*		Total Acres in Right of Way	%
Preferred Alternative	1,631	588	274	862	53

*Acreages are calculated for the refined preliminary design right of way (January 2010). Areas of prime and statewide important soils already in urban development were not included in the totals.

In accordance with the Farmland Protection Policy Act (FPPA) and FHWA's *Guidelines for Implementing the Final Rule of the Farmland Protection Policy Act for Highway Projects*, a "Farmland Conversion Impact Rating for Corridor Type Projects" form published by the NRCS was prepared for each DSA and included in Appendix I of the Draft EIS.

The ratings on the NRCS forms are comprised of two parts. The Land Evaluation Criterion Value represents the relative value of the farmland to be converted on a scale from 0 to 100 points. The Corridor Assessment, which is rated on a scale of 0 to 150 points, evaluated farmland soils based upon its use in relation to the other land uses and resources in the immediate area. The two ratings are added together for a possible total rating of 260 points. Sites receiving a total score of 160 points or more are given increasingly higher levels of consideration for protection (7 CFR 658.4).

The NRCS forms for DSA 9 included in Appendix I of the Draft EIS still apply to the Preferred Alternative. As listed in the forms, total acres of prime and unique farmland were assumed to be 793 acres and total acres of statewide and local important farmland were assumed to be 308 acres. These values are both greater than the values listed in **Table 2-7**. Therefore, the Land Evaluation Criterion Value reported on the form for DSA 9 would be the same or higher than what the value would be if the updated acreages were used.

The total points for DSA 9 are124 points for the portion of the project in Gaston County and 122 points for the portion of the project in Mecklenburg County. Since the soils impacted by the Preferred Alternative do not meet the threshold of protection based on the evaluation under the FPPA, the impacts to prime and statewide important farmland are not considered under the FPPA.

Local Agricultural Programs. As discussion in **Section 1.3.2.3** and in Section 4.3.3 of the Draft EIS, Gaston County adopted a Voluntary Agricultural District (VAD) ordinance in July 2004 under the authority of the Agricultural Development and Farmland Preservation Enabling Act (NCGS Chapter 106 Sections 735-743). Figure 4-3 in the Draft EIS shows VAD properties in the Project Study Area. Mecklenburg County does not have a VAD ordinance.

The Preferred Alternative would impact ten VAD properties. The VAD properties have a total acreage of approximately 449 acres. The acreage impacted would be approximately 49 acres.

Farmland

The Preferred Alternative would require relocation of one farm and would impact land from 10 parcels participating in the Gaston County Voluntary Agricultural District program.

Although the Preferred Alternative would impact agricultural lands in Gaston County, the project is consistent with the County's land use plans, which designate southern Gaston County as an area targeted for more suburban development. Discussion with Gaston County staff and reviews of local planning documents indicate that the area surrounding the proposed project is slated for suburban development.

The NCTA will comply with the VAD ordinance (*Gaston County Voluntary Agricultural District Ordinance,* Gaston County Web site: www.co.gaston.nc.us/ordinances/VADordinance2004-07-22.pdf) and will work with Gaston County regarding public hearings related to land condemnation proceedings against the VAD parcels prior to right-of-way acquisition.

Farm Relocations. Estimated farm relocations have not changed since the Draft EIS was prepared (Section 4.3.4.3). The Preferred Alternative would require relocation of one farm, located on Victory Trail east of Rufus Ratchford Road. Because much of southern Gaston County is still rural, it is anticipated that there would be suitable replacement property available for relocation of this farm.

2.5.2.4 Utilities and Infrastructure

Utility Service

NCTA will coordinate with local utilities during final design and construction to avoid and minimize disruptions in service.

Impacts to utilities and infrastructure reported in Section 4.4 of the Draft EIS and **Section 1.3.2.4** have not changed for the Preferred Alternative, except for the addition of a Norfolk Southern rail spur at the Charlotte-Douglas International Airport described below.

Utilities addressed include electric power, water and sewer facilities, natural gas, telecommunications, and railroads. The Preferred Alternative has the potential to impact utilities, as summarized below.

Electrical Power Generation and Transmission. The Preferred Alternative would not impact operations at the Duke Power Corporation's Allen Steam Station. The Preferred Alternative would cross 14 major electrical power transmission line easements. The preliminary design refinements made to the Preferred Alternative avoided two electric transmission towers (**Section 2.3.1.9**). However, other transmission towers may be affected. Additional opportunities to minimize conflicts with electric power facilities would be investigated during final design.

Any modifications to the high-voltage electric power transmissions lines necessary to accommodate the proposed project are not expected to adversely impact the transmission lines or consumer electrical service in the area. Any impacts and relocations of power transmission lines or towers would be coordinated with Duke Energy Corporation and the Rutherford Electric

Membership Cooperative (EMC) during final design. Impacts to distribution lines would be coordinated with Duke Energy Corporation, Rutherford EMC, and the City of Gastonia prior to construction.

Natural Gas. The Preferred Alternative crosses the natural gas transmission easements owned by Plantation Pipeline Company and Colonial Pipeline Company described in Draft EIS Section 4.4.1.2 and **Section 1.3.2.4**. Each easement contains two natural gas transmission pipelines. The refined preliminary design for the Preferred Alternative does not encroach on the easement owned by the Transcontinental Gas Pipeline Corporation. The Preferred Alternative also crosses numerous natural gas distribution lines.

Although both natural gas transmission and distribution lines would be crossed by the Preferred Alternative, the project is not expected to impact consumer gas service. To avoid disruptions in service and delivery, the NCTA would coordinate any required relocation or modification of transmission lines with Plantation Pipeline Company and Colonial Pipeline Company and any required relocation or modification of distribution lines with area providers, including PSNC Energy and Piedmont Natural Gas.

Telecommunications. Neither the communication tower nor the cell tower described in **Section 1.3.2.4** is anticipated to be impacted by the Preferred Alternative. During final design of the Preferred Alternative, all telecommunication utility providers would be consulted to ensure that the proposed design and construction of the project would not substantially disrupt service.

Water Service. Most of the land in Gaston and Mecklenburg County crossed by the Preferred Alternative does not have public water service. Those areas that do have service are located between I-85 and Linwood Road and an area east of US 321. In addition, a small area in Belmont crossed by the Preferred Alternative is served by public water (Draft EIS Figure 4-4), and the Preferred Alternative would cross a public water line along Southpoint Road that extends to the end of the peninsula. The remaining areas crossed by the Preferred Alternative are served by private or community wells.

In the areas served by public water, the Preferred Alternative would cross water lines, but water service is not expected to be disrupted. Prior to project construction, the NCTA would coordinate any water line relocation or reconfiguration with the appropriate municipality or county.

Wells within the Preferred Alternative right of way would be surveyed prior to project construction. NCTA would purchase these wells and cap and abandon them in accordance with State standards (15A NCAC 2C). Any subsurface contamination would be reported to the regional office of NCDENR.

Sewer Service. Most of the areas crossed by the Preferred Alternative do not have public sewer service. Those areas that do are located in the western end of the project, around US 321, and in Mecklenburg County (Draft EIS Figure 4-4). The remainder of the Preferred Alternative area is served by private septic tanks or community treatment systems.

The Preferred Alternative would not impact sewage treatment facilities or public sewer service within the Project Study Area. Any sewer line relocation or reconfiguration required for construction of the Preferred Alternative would be coordinated with the affected municipalities or counties, and is not expected to disrupt service.

Railroads. The Preferred Alternative would cross two Norfolk Southern rail lines and two spur lines. All crossings would be grade separated.

The Norfolk Southern mainline that runs east-west through Gaston County would be impacted by the Preferred Alternative. As shown in **Figure 2-3b**, the track is close to, and parallels, the east side of NC 274 (Bessemer City Road). Because the proposed Gaston East-West Connector/I-85 interchange is close to the I-85/NC 274 interchange, the I-85/NC 274 interchange ramps and the mainline of I-85 need to be modified to accommodate the new interchange to the west. Modifications would require the replacement of the existing railroad bridge over I-85. It is expected that the replacement bridge could be built in the existing bridge location, with a temporary detour bridge constructed immediately to the east during the bridge construction. Substantial disruptions in rail service are not anticipated. Additional coordination would be conducted regarding the Norfolk Southern mainline near I-85.

The Preferred Alternative would cross the Norfolk Southern branch line that runs north-south parallel to the east side of US 321. The interchange design at US 321 has the ramps located on the west side of US 321 to avoid the rail line.

The Preferred Alternative would cross the rail spur that serves Duke Energy Corporation's Allen Steam Station.

The Preferred Alternative also would cross the new Norfolk Southern rail spur located east of I-485 that will serve the intermodal facility at the Charlotte-Douglas International Airport. As discussed in **Section 2.3.1.12**, the refined preliminary design would utilize a planned bridge over the spur.

Final design of the Preferred Alternative would be coordinated with the NCDOT Rail Division and the rail line owners to ensure that the grade-separated crossings of rail lines incorporate the appropriate horizontal and vertical clearances, in accordance with current standards.

2.5.2.5 Visual Resources

Visual resources and existing overlay districts are described in Draft EIS Section 4.5, and have not changed since publication of the Draft EIS.

Travelers Using the Gaston East-West Connector. The Preferred Alternative has the potential to offer users of the proposed project visually pleasing views of the project and its surroundings, such as valleys, hills, wooded areas, farmlands, streams, and cultural features.

Gaston County has demonstrated its intention to maintain aesthetic and visually pleasing development immediately surrounding the proposed project through the establishment of the Garden Parkway Interchange (GPX) District and the Garden Parkway (GP) Overlay District in the Unified Development Ordinance (UDO).

Landscaping and Aesthetics

The NCTA will develop a landscaping plan and aesthetic design plan as part of final design to enhance views of the project.

During the final design of the Preferred Alternative, NCTA would incorporate a landscaping and aesthetic plan into the project that would enhance views within the right of way.

Users of Surrounding Roadways and Residential Areas. For people in the residential areas and on roadways surrounding the Preferred Alternative, the project's fill slopes and structures have the potential to detract from existing views. However, due to natural changes in elevation, the project's cut slopes in areas outside of floodplains, and tall trees within the area, much of the roadway would not be visible from areas outside the project's immediate vicinity.

Overall, visual changes would be intermittent, with some residents subjected to a view of the roadway, and other views shielded by the cut/fill areas, forested areas, and project landscaping.

The project's landscaping plan and the zoning requirements of the GPX District and GP Overlay District also will enhance and maintain aesthetics for these viewer groups, as well as those using the Gaston East-West Connector.

Boaters and Residents along the South Fork Catawba River and Catawba River. The Preferred Alternative would construct bridges over the South Fork Catawba River and Catawba River. Boaters on these rivers, as well as some riverfront and nearby residents, would experience a substantial change in those views found within the vicinity of the bridges.

During final design for the Preferred Alternative, NCTA would investigate the feasibility and reasonableness of incorporating cost-effective treatments for the bridge sides, piers, and railings in order to enhance aesthetics as part of an aesthetic plan for the project. This is included as a special project commitment in **Chapter PC**.

Visitors to the Daniel Stowe Botanical Garden. The Preferred Alternative is not anticipated to adversely impact the Botanical Garden, or be close enough to be visible from the areas of the DSBG open to the public.

Visitors in Crowders Mountain State Park. The Preferred Alternative is one of the DSAs farthest from Crowders Mountain State Park.

The park's appeal includes views of the surrounding region, and there are areas of the park that would experience a change in existing viewsheds. The northeast overlook, Summit Tower, Rock Top Trail, and Tower Trail each have the potential to offer full or limited views of the proposed project from locations along the trails and/or summit where views to the east are possible. Although viewers may notice an immediate change with construction of any of the DSAs, it is anticipated that over time, the proposed project would blend with the suburbanizing landscape that is expected to develop with the project or without (No-Build Alternative).

2.5.2.6 Hazardous Materials

Hazardous Materials Sites

Twenty-eight sites were identified within the Preferred Alternative corridor. Two sites received a moderate-high potential impact rating.

An updated hazardous materials evaluation was prepared by the NCDOT Geotechnical Engineering Unit to identify potentially contaminated sites within the project corridor for the Preferred Alternative. The results are presented in a *Hazardous Materials Report* (NCDOT, October 29, 2009, incorporated by reference).

Hazardous material impacts may include active and abandoned underground storage tank (UST) sites, hazardous waste sites, regulated landfills and unregulated dump sites. The State's GIS database was used to identify known sites of concern within the project corridor. Geotechnical Engineering Unit personnel conducted field investigations along the Preferred Alternative corridor between September 30 and October 1, 2009. A search of appropriate environmental agencies' databases was performed to assist in evaluating identified sites.

Twenty-eight sites were identified within the Preferred Alternative corridor. The sites include six UST sites, three hazardous waste sites, seven manufacturing facilities, five junkyards, six automotive repair facilities, and one automobile race track (Carolina Speedway). **Figure 2-5** shows the approximate locations of the sites.

Table 2-10 summarizes the impacts of the potentially contaminated sites on the Preferred Alternative, including the anticipated level of potential impact and the type of contamination

expected to be encountered at each site. There were two sites within the corridor that received a "moderate to high" impact rating. Low, moderate, and high ratings are defined as follows:

- Low – Little to no impacts to cost or schedule anticipated.
- Moderate – Additional costs and time may be incurred due to the handling of contaminated materials, and a need for special construction techniques or products.
- High - Costs and scheduling could overwhelm smaller projects and cause serious delays in larger projects. Liability may fall upon the NCTA to clean up contamination, which could require decades. These sites should be avoided to the extent possible.

TABLE 2-10: Hazardous Materials Sites in the Preferred Alternative Corridor

Site Number	DEIS Site Number[1]	Site Type and Facility ID Number	Location	UST Owner	Other Information[2]	Anticipated Type of Impact	Anticipated Impact Severity
1	1	UST 0-016633	1210 Edgewood Rd, Bessemer City	Acme Petroleum and Fuel Co	Former Shell gas station GWI 27458	Petroleum contaminated soils	Low
2	2	UST 0-016693	1205 Edgewood Rd, Bessemer City	United Oil Co	Edgewood Mini Mart – current gas station GWI 23944	Petroleum contaminated soils	Low
3	16	Haz Waste Facility/Manuf 000-615-872	1260 Shannon Bradley Rd, Gastonia	N/A	Manuf facility – hazardous waste facility Former AMP, Inc.	Chemicals	Low to Moderate
4	6	UST 0-015530	1520 Shannon Bradley Rd, Gastonia	BellSouth Telecomm	One UST in use	Petroleum contaminated soils	Low
5	7	UST 0-016617	1721 Bessemer City Rd, Gastonia	S&S USA, Inc	Grab-N-Go – current Citgo gas station GWI 27159	Petroleum contaminated soils	Low
6	10	UST 0-016709 0-216709	1651 Bessemer City Rd, Gastonia	United Oil of the Carolinas	Stuarts BP – current gas station GWI 10328	Petroleum contaminated soils	Low
7	9	UST 0-016178	1900 Jenkins Dairy Rd, Gastonia	Western Auto Supply Co	Currently Advance Auto Store GWI #16116/27615	Petroleum contaminated soils	Low
8	14	UST 0-016839/ Manuf	2900 Northwest Blvd, Gastonia	Dana Wix Corp Allen Plant	Current filter manufac. Facility; Tank removed 1987	Petroleum contaminated soils	Low
9	15	Haz Waste Facility/Manuf 000-003-194	3021 Northwest Blvd, Gastonia	N/A	Chrome plating facility; small-quantity generator	Chemicals	Low
10	12	UST	3112 Northwest Blvd, Gastonia	Sands and Co, Inc	Currently Park Elevators GWI #18990	Petroleum contaminated soils	Low
11	12	--	3124 Northwest Blvd, Gastonia	N/A	GWI #18990 from Site 10 extends to this parcel	Petroleum contaminated soils	Low
12	--	Junkyard	440 Shannon Bradley Rd, Gastonia	N/A	Auto repair business	None	Low
13	20	Junkyard	3301 W Franklin Blvd (US 29-74), Gastonia	N/A	Patterson Auto Parts – salvage yard	Petroleum contaminated soils	Low to Moderate
14	19	Auto salvage	3038 W. Franklin Blvd, Gastonia	N/A	Mac's Auto Parts – possible former gas station	Petroleum contaminated soils	Low
15	19	Junkyard	3026 W. Franklin Blvd, Gastonia	N/A	Muffler Brake Shop and junkyard managed by Mac's Auto (site 14)	Petroleum contaminated soils	Low to Moderate

TABLE 2-10: Hazardous Materials Sites in the Preferred Alternative Corridor

Site Number	DEIS Site Number[1]	Site Type and Facility ID Number	Location	UST Owner	Other Information[2]	Anticipated Type of Impact	Anticipated Impact Severity
16	--	Equipment repair	3031 W. Franklin Blvd, Gastonia	N/A	Sparks Grading & Excavating	Petroleum contaminated soils	Low
17	18	Junkyard	3001 W Franklin Blvd (US 29-74), Gastonia	N/A	Putnam's Auto Parts	Petroleum contaminated soils; hazardous waste	Moderate to High
18	--	Junkyard	2920 W Franklin Blvd (US 29-74), Gastonia	N/A	Junkyard	Petroleum contaminated soils	Moderate
19	--	Auto Repair	2845 W Franklin Blvd (US 29-74), Gastonia	N/A	Russell's Paint & Body Shop	Petroleum contaminated soils	Low
20	28	UST 0-003235/ Manuf	207 Telegraph Rd, Gastonia	BF Goodrich	Lubrizol Corp. 12 USTs removed between 1991-1999 GWI #15733	Petroleum contaminated soils & chemicals	Low
21	32	Manuf	4604 York Hwy, Gastonia	N/A	Former metal foundry and casting shop; owned by Bruce's Iron & Metal	Metals	Moderate to High
22	--	Auto Repair	4550 York Hwy, Gastonia	N/A	Auto repair/used car sales	Petroleum contaminated soils	Low
23	--	Manuf	4619 York Hwy, Gastonia	N/A	Former metal fabrication facility	None	Low
24	--	Junkyard	407 Davis Heights Dr, Gastonia	N/A	Junkyard; Former auto repair (Johnny Parker's Garage)	Petroleum contaminated soils	Low
25	32	UST 0-001629	4604 S. York Hwy, Gastonia	Bruce's Iron & Metal Inc	Metal recycling/scrap yard; 4 tanks removed GWI 16955/20049	Petroleum contaminated soils	Moderate
26	34	Haz Waste Facility NCD 3154010	4801 York Hwy, Gastonia	N/A	AB Carter, Inc Inactive hazardous waste site	Soil and ground water contamin-ation	Low
27	--	Other	6355 Union Rd, Gastonia	N/A	Carolina Speedway - 0.4 mile dirt track	Petroleum contaminated soils	Moderate
28	41	UST 0-015988	1901 South Point Rd, Belmont	Petroleum World, Inc	Jim's Grocery & South Point Grill GWI #05140/20049	Petroleum contaminated soils	Low

Source: *Hazardous Materials Report*, NCDOT Geotechnical Engineering Unit, October 2009.
Notes: [1]As presented in Draft EIS Table 4-13 and Appendix J, Table J-1. [2]GWI – groundwater incident.

Eight of the sites in **Table 2-10** are additional sites discovered during field investigations for the updated *Hazardous Materials Report* that were not reported in the Draft EIS. Ten of the potentially contaminated sites shown in Table 4-13 of the Draft EIS as impacting DSA 9 are not included in **Table 2-10**. According to the NCDOT Geotechnical Engineering Unit (Email from Mr. Terry Fox, NCDOT Geotechnical Unit, February 2, 2010), these sites were not included in the 2009 *Hazardous Materials Report* for one of the following reasons: 1) field inspections revealed that the actual former UST location was well outside of the proposed corridor for the Preferred Alternative, 2) the site is included as part of another site, or 3) the site was remediated.

The Geotechnical Engineering Unit would provide soil and groundwater assessments on each of the properties listed in **Table 2-10** before right-of-way acquisition. The discovery of additional sites not recorded by regulatory agencies and not reasonably discernable during the field investigations may occur.

2.5.2.7 Floodplains and Floodways

Floodplains and floodways in the Project Study Area are described in **Section 1.3.2.7**.

Impacts to Floodplains and Floodways. As discussed in Section 4.7.3 of the Draft EIS, a preliminary hydraulics analysis (*Final Preliminary Hydraulic Technical Memorandum for the Gaston County East-West Connector*, PBS&J, December 2007) was performed to identify the preliminary sizes and locations of major drainage structures along the DSAs that would be needed to adequately carry floodwaters. Major drainage structures are bridges, box culverts, or pipe culverts greater than 72 inches in diameter.

The locations of major drainage structures for the Preferred Alternative are shown on Figure 4-7 of the Draft EIS. Appendix H of the Draft EIS includes details about the crossing locations such as preliminary drainage structure size and length, floodplain width, and floodway width.

The major drainage structures and crossings were reviewed by the environmental regulatory and resource agencies at TEAC Meetings on February 5, March 4, and April 8, 2008. As a result of these meetings, the NCTA agreed to include several bridges in the preliminary design beyond those required to convey floodwaters. For the Preferred Alternative, these included bridging Blackwood Creek (Stream S135) and lengthening the mainline bridge over Catawba Creek (Stream S259) to span the main body of Wetland W248. This extension would also avoid impacting the Catawba River buffer areas on the east side of the creek.

Floodplains and Floodways

The Preferred Alternative crosses 10 floodways and 13 floodplains. There also would be an unavoidable longitudinal encroachment along the Crowders Creek floodplain. The Preferred Alternative will be designed to comply with all applicable State and local floodplain protection standards.

The Preferred Alternative includes six bridge crossings over water and 45 major culverts or pipes. There would be ten crossings of floodways and thirteen crossings of floodplains. The preliminary design for the Preferred Alternative in Corridor Segment J4a would involve a longitudinal encroachment on the edge of the Crowders Creek floodplain just north of New Haven Drive. This longitudinal encroachment would be approximately 1,400 feet in length and include an area of approximately five acres.

During final design of the Preferred Alternative, a detailed hydrologic and hydraulic analysis would be performed for each crossing location to determine the actual size and configuration of each structure. Also, for all new location crossings on Federal Emergency Management Agency (FEMA)-regulated streams (streams where a floodway and/or floodplain has been identified), a Conditional Letter of Map Revision (CLOMR) and Letter of Map Revision (LOMR) would be prepared and submitted to the NC Floodplain Mapping Program or Mecklenburg County, as applicable, for approval.

In National Flood Insurance Program flood hazard areas, the final hydraulic designs for the Preferred Alternative would be such that the floodway would carry the 100-year flood without a substantial increase in flood elevation. The effect of the project on floodwaters could be mitigated effectively through proper sizing and design of hydraulic structures.

A LOMR is FEMA's modification to an effective Flood Insurance Rate Map (FIRM), or Flood Boundary and Floodway Map (FBFM), or both. LOMRs generally are based upon the implementation of physical measures affecting the hydrologic or hydraulic characteristics of a flooding source, and thus result in the modification of the existing regulatory floodway, the effective Base Flood Elevations, or the Special Flood Hazard Area. The LOMR officially revises the FIRM or Flood Boundary and FBFM, and sometimes the Flood Insurance Study report, and when appropriate, includes a description of the modifications (FEMA Web site: www.fema.gov/plan/prevent/floodplain/nfipkeywords/lomr.shtm).

Floodplain Finding. Executive Order 11988 directs federal agencies to refrain from conducting, supporting, or allowing actions in floodplains unless it is the only practicable alternative. The FHWA requirements for compliance with this Executive Order are included in 23 CFR 650 Subpart A.

In accordance with 23 CFR 650.113, "A proposed action which includes a significant encroachment shall not be approved unless the FHWA finds that the proposed significant encroachment is the only practicable alternative. This finding shall be included in the final environmental document (final environmental impact statement or finding of no significant impact) and shall be supported by the following information:

(1) The reasons why the proposed action must be located in the flood plain,

(2) The alternatives considered and why they were not practicable, and

(3) A statement indicating whether the action conforms to applicable State or local flood-plain protection standards.

A "Significant encroachment" shall mean a highway encroachment and any direct support of likely base flood-plain development that would involve one or more of the following construction- or flood-related impacts (23 CFR 650.105):

- A significant potential for interruption or termination of a transportation facility which is needed for emergency vehicles or provides a community's only evacuation route.
- A significant risk, or
- A significant adverse impact on natural and beneficial flood-plain values.

The Preferred Alternative would cross floodplains associated with Oates Branch, Bessemer Branch, Crowders Creek, Blackwood Creek, Stream S146 (unnamed tributary to Crowders Creek), Catawba Creek, South Fork Catawba River, Catawba River, Beaverdam Creek, and Legion Lake Stream.

With the exception of the longitudinal floodplain encroachment of Crowders Creek, the proposed crossings are as perpendicular as possible, considering other surrounding constraints such as neighborhood, community resources, natural resources, etc. Crossings of Oates Branch and Bessemer Branch would occur at I-85 and would involve extensions of existing culverts under I-85. Blackwood Creek, Stream S146, Catawba Creek, South Fork Catawba River, and Catawba River would be bridged. Beaverdam Creek would be crossed by the mainline with a double eight-foot by eight-foot reinforced concrete box culvert, and by an access road with a double nine-foot by eight-foot reinforced box culvert. Legion Lake Stream would be crossed via extensions of existing culverts under I-485.

The Preferred Alternative would involve a longitudinal encroachment on the fringe of the Crowders Creek floodplain just north of New Haven Drive, as shown in **Figure 2-3f**. This

longitudinal encroachment would be approximately 1,400 feet in length and include an area of approximately five acres within the right of way.

This longitudinal encroachment is minimized to the extent practicable based on the refined preliminary design for the Preferred Alternative and information available to date. Just south of this encroachment, the Preferred Alternative turns eastward to an interchange with US 321. The curve of the mainline in this area is constrained by the interchange design. Also, moving the mainline eastward, out of the floodplain area, would encroach on a NC Natural Heritage Program Important Natural Area (Stagecoach Road Granitic Outcrop) and would result in a crossing of the Blackwood Creek floodplain in a wider area.

In NFIP flood hazard areas, the final hydraulic designs for the Preferred Alternative will ensure that the floodway will carry the 100-year flood without adversely affecting floodplain elevations. The effect of the Preferred Alternative can be mitigated effectively through proper sizing and design of hydraulic structures (culverts, bridges, and channel stabilization).

All the alternatives considered for the project are described in Chapter 2 of the Draft EIS and briefly in **Section 1.2** of this Final EIS. The Preferred Alternative was selected based on a consideration of impacts to natural resources and the human and physical environments, and on the ability to minimize impacts (**Section 2.2**). As such, there is no other practicable alternative for the proposed project.

The proposed action would comply with all applicable State and local floodplain protection standards. The NCTA would coordinate with the NC Flood Mapping Program for floodplains in Gaston County and with Charlotte-Mecklenburg Storm Water Services for floodplains in Mecklenburg County.

2.5.3 CULTURAL RESOURCES AND SECTION 4(F) AND SECTION 6(F) RESOURCES

2.5.3.1 Historic Architectural Resources

Section 5.2 of the Draft EIS includes descriptions of the historic architectural resources in the project's Area of Potential Effects (APE). There have been no updates to this information since the Draft EIS was published.

As discussed in Section 5.2.1.1 and shown on Figure 5-1 of the Draft EIS, the APE extends beyond the DSA corridor boundaries and is about 22 miles long and one to three miles wide, with an area of approximately 31,600 acres. It encompasses areas of both direct and indirect effects that may result from the proposed project, including possible takings, alterations to historic view sheds, and the introduction of noise elements.

Historic Architectural Resources

The Preferred Alternative would not have adverse effects on historic resources on or eligible for listing on the National Register of Historic Places.

Meetings were held with the State Historic Preservation Office (HPO) on April 21, 2008 and July 21, 2008 to reach concurrence on NRHP-eligible properties and to reach concurrence on the assessment of effects to listed and eligible properties from the DSAs. Concurrence forms are included in Appendix A-2 of the Draft EIS.

Effects were determined based on the preliminary designs for each DSA. **Table 2-11**, based on Draft EIS Table 5-1, presents the effects determination for each listed and eligible property in

relation to the Preferred Alternative, as well as any conditions placed on the Preferred Alternative to achieve a No Adverse Effect determination.

TABLE 2-11: Effects to Historic Architectural Resources from Preferred Alternative

Property Name	Site No.	Size (Acres)	Effects Determination*	Additional Notes
Wolfe Family Dairy Farm	GS 1327	~257	No Effect	--
Pisgah ARP Church	GS 00547	~2	No Effect	--
Jake Long Dairy Barn	GS 1320	< 1	No Effect	--
William Wilson House	GS 00198	~ 1	No Effect	--
William Alexander Falls House	GS 00169	~6	No Effect	--
Mendenhall-Grissom House	GS 00173	~13	No Effect	--
Stowe-Caldwell-Lowery House	GS 00179	~2	No Effect	--
William Clarence Wilson House	GS 00341	~1	No Effect	--
JBF Riddle House	GS 00337	~2	No Adverse Effect	No Adverse Effect provided the shoulder width and ditch slope do not result in taking of property either by fee simple or permanent easement.
Harrison Family Dairy Farm	GS 1322	~80	No Adverse Effect	No Adverse Effect if full access to the property is maintained.
William N. Craig Farmstead	GS 00320	~19	No Effect	--
Thomas Allison House	GS 00316	~4	No Effect	--
Dillard-Falls House	GS 1323	~3	No Effect	--
Bridge No. 350022	Pending	Bridge footprint	No Effect	--
Byrum-Croft House	MK 2841	~5	No Effect	--
Steele Creek Presbyterian Church and Cemetery	MK 01377	~20	No Effect	--
Steele Creek Presbyterian Church Manse	MK 1378	~7	No Effect	--
Shopton Rural Historic District	--	~16	No Effect	--

Source: April 21, 2008 Effects Meeting – HPO, FHWA, NCTA, and NCDOT.

* Effects determination based upon refined preliminary design.

As shown in **Table 2-11**, the Preferred Alternative has a No Adverse Effect determination to JBF Riddle House and Harrison Family Dairy Farm. The No Adverse Effect determination is based on the preliminary design shown in the Draft EIS. In the area near JBF Riddle House (**Figure 2-3i**), the refined preliminary design is the same as the preliminary design shown in the Draft EIS and the conditions are maintained for the No Adverse Effect determination. The shoulder width and ditch slope would not result in taking of property from the JBD Riddle House.

In the area near the Harrison Family Dairy Farm (**Figure 2-3k**), the refined preliminary design of the NC 274 (Union Road) interchange changed compared to the Draft EIS preliminary design.

However, near the Harrison Family Dairy Farm, the proposed improvements to NC 274 (Union Road) are the same and full access to the property is maintained, which means the conditions are met to maintain the No Adverse Effect determination. As with the Draft EIS preliminary design, the refined preliminary design of the Preferred Alternative would not require land from the Harrison Family Dairy Farm.

2.5.3.2 Archaeological Resources

An intensive archaeological survey was conducted for the Preferred Alternative. The survey is documented in the *Archaeological Survey and Evaluation of Detailed Study Alternative 9 (Recommended Route) for the Proposed Gaston East-West Connector* (Coastal Carolina Research, February 2010), incorporated by reference into this Final EIS. This study is referred to in this section as the *Intensive Archaeological Survey*.

Area of Potential Effects. The APE for the *Intensive Archaeological Survey* included the DSA 9 preliminary design right of way, ranging in width from 300 feet on the mainline corridor to more than 1,400 feet in some of the proposed interchange areas. The corridor right of way encompassed approximately 1,865 acres. Three non-contiguous areas of right of way for access roads also were included in the survey. These areas encompassed slightly less than 20 acres. Previously surveyed areas that required no further archaeological survey comprised approximately 164 acres.

Survey Methods. The North Carolina Office of State Archaeology (OSA) was consulted at a meeting on July 30, 2009, prior to commencement of the surveys, to review the approach and scope of the study. A letter from OSA summarizing the meeting is included in **Appendix K**.

The *Intensive Archaeological Survey* covered all previously unsurveyed portions of the APE. Areas that were disturbed, extremely sloped, or low and wet were examined on foot but not intensely surveyed. In remaining areas, shovel tests were conducted at appropriate intervals. Recovered artifacts were processed and analyzed, as described in the *Intensive Archaeological Survey*.

Archaeological sites within the APE that appeared to retain significant deposits were investigated to gather data on the sites' dimension and artifact distribution, presence or absence of subsurface features, site integrity, and composition. The testing was limited to the amount necessary to determine a site's significance in terms of NRHP criteria.

Previously Identified Sites. Background research was conducted as part of the *Archaeological Assessment of Detailed Study Alternatives for the Proposed Gaston East-West Connector* (Coastal Carolina Research, Inc., April 2007), as reported in the Draft EIS. There were 33 previously recorded sites within or immediately adjacent to the DSAs (Section 5.3.1.1 of the Draft EIS).

Of these 33 sites, ten previously recorded sites were identified as lying within or adjacent to the intensive survey APE. Of these ten, one site, 31GS0337** - Stowesville Cotton Mill, was recommended for additional evaluation to determine whether the site is eligible for listing on the NRHP. The other nine sites were recommended as not eligible for listing on the NRHP or not requiring further work. These sites are listed in **Table K-1** in **Appendix K**.

In addition, two cemeteries (Fall Farm and Mt. Pleasant Baptist Church) and two possible gold mine locations within or near the intensive survey APE were presented in the previous archaeological assessment summarized in the Draft EIS.

The Fall Farm Cemetery (Site 01-06) is noted in local records (Gaston County Historical Society, 1998) as a small, unmarked cemetery. Its general vicinity was recorded as near the *Intensive Archaeological Survey* APE, but evidence of the cemetery was not encountered during the assessment's cemetery reconnaissance, despite surface inspection and inquiries with area residents.

The Mt. Pleasant Baptist Church Cemetery (Site 03-35) is a small cemetery recorded as an archaeological site during the *Intensive Archaeological Survey*. It is described below.

The two possible gold mine locations were based on notations for mines or quarries in the Gaston County Soil Survey (Woody, 1989). These locations were investigated during the intensive survey, as described below.

Intensive Archaeological Survey Results. The *Intensive Archaeology Survey* identified 32 sites and eleven isolated finds newly recorded within the intensive survey APE. Four sites are potential gold mines. One of the newly recorded sites is the Mt. Pleasant Baptist Church Cemetery, previously identified in local records as Site 03-35, and is now recorded as Site 31GS0368**.

Archaeological Resources

No archaeological resources identified in the Intensive Archaeological Survey for the Preferred Alternative were determined eligible for the National Register of Historic Places.

The Mt. Pleasant Baptist Church cemetery is located near the intersection of Tucker Road and NC 273 (Southpoint Road). This cemetery, which is determined not eligible for the NRHP, consists of 93 marked graves in an unfenced but well-maintained plot of land, with additional depressions noted that could represent unmarked graves. The earliest marked grave is dated 1914, while the most recent burial occurred in 2008. As discussed in **Sections 2.3.1.10** and **2.5.1.5**, the cemetery's historic boundaries were larger than present-day property boundaries. The Preferred Alternative refined preliminary design avoids the areas of marked and potential unmarked gravesites in both the existing and historic boundaries of the cemetery.

The survey also revisited one previously recorded site (31GS0337**- the Stowesville Cotton Mill). These sites and isolated finds are listed in **Table K-2** of **Appendix K**.

The *Intensive Archaeology Survey* involved detailed evaluation of four sites in order to determine their eligibility for listing on the NRHP: 31GS0355/355**, 31GS0358**, 31GS0337/337**, and 31GS0365/365**. These sites are described below.

*Site 31GS0355/355***. This site is an approximately 2.4-acre site located on a well-defined ridge landform between two unnamed drainages. It consists of brick/stone piles, the partial articulated remnants of a chimney, a depressed area, possible stone piers that may represent an original house location, surface and subsurface historic artifacts, modern debris, and low density Native American lithic scatter. Artifacts recovered during the survey for the April 2007 assessment are consistent with occupation beginning in the late nineteenth century or early twentieth century. Although no additional fieldwork was recommended by OSA as a result of the April 2007 assessment, additional archival research was conducted to provide information on the dating of the site. Results of the archival research are presented in the *Intensive Archaeological Survey*.

*Site 31GS0358***. This site is a historic domestic scatter site located just south of Craig McKee School Road. The site is located on a broad ridge landform above an unnamed tributary of Catawba Creek. The site includes a historic domestic component appearing to date to the late eighteenth century through the early to mid-nineteenth century. A lack of disturbance noted in the soil profiles during the initial assessment suggested that the site has the potential for intact

cultural deposits. However, intensive evaluation of this site did not reveal the potential for intact cultural deposits.

*Site 31GS0337/337***. This site is the location of the Stowe's Cotton Factory/Gaither's Mill complex, which dates to the mid-nineteenth century. The mill itself is under the water of Lake Wylie, but components associated with the mill complex are extant. Water-powered mills were an important part of the historic rise of industrialization. The development of the Piedmont of North Carolina as the industrial leader of the state was tied to the development of water-powered industries. Mills were frequently one of the first industries in an area, and the Stowe's Factory has been identified as the third mill in Gaston County.

The only surviving element with intact remains is a stone foundation. Given its distance from the water, this foundation is likely not the foundation of the mill itself, but appears to be a domestic structure.

*Site 31GS365/365***. This site is a Native American and historic artifact scatter located off Gaither Road. This approximately 1.1-acre site is on a ridge landform and is thought to be part of the Stowe's Factory complex. The artifacts recovered from the site are similar to and date from the same time period as those for the house site at 31GS0337/337**. It appears likely that this site is a village or settlement associated with the mill complex at 31GS0337/337**.

Based on intensive survey of site 31GS0365/365**, the Native American component of this site consists of an indeterminate lithic scatter intermixed with historic materials. The intermixing of the historic and Native American materials, as well as the lack of intact Native American features or temporally diagnostic artifacts, suggests this site lacks the potential to contain information concerning Native American occupations in the Piedmont of North Carolina. The historic component consists of a relatively high density of historic materials dating to the mid-nineteenth century and an articulated brick feature that appears to represent the remains of a brick road or drive.

Section 106 Coordination. In a memorandum dated May 21, 2010 (included in **Appendix K**), the HPO concurred that no archaeological sites identified within the APE are eligible for the NRHP. The *Intensive Archaeological Survey* recommended that two sites (31GS337/337** and 31GS365/365**) were potentially eligible for listing on the NRHP. However, based on an evaluation of the survey results, HPO and FHWA concurred that these sites do not retain the level of integrity nor do they possess the potential to yield significant new information pertaining to the history of North Carolina. Therefore, these sites are not eligible for listing on the NRHP.

2.5.3.3 Section 4(f) and Section 6(f) Resources

Section 4(f) Resources. There are three publicly-owned parks and eighteen significant historic sites located in or near the DSAs that are protected by Section 4(f) (49 USC Section 303 and 23 CFR Part 774).

Parks. Publicly-owned parks include Crowders Mountain State Park, Gaston County's Park at Forestview High School, and Mecklenburg County's Berewick Regional Park.

Section 4(f) Resources

The Preferred Alternative refined preliminary design would not directly impact any Section 4(f) resources.

As described in Section 5.4.3 of the Draft EIS, none of the DSAs (including the Preferred Alternative) would directly or indirectly impact Crowders Mountain State Park or Gaston

County's Park at Forestview High School. However, all of the DSAs' preliminary designs included in the Draft EIS would encroach upon Berewick Regional Park.

Based upon the preliminary design in the Draft EIS, the Preferred Alternative would impact approximately 1.6 acres on the east end of the park, adjacent to I-485. This minor encroachment on the edge of the property owned by Mecklenburg County was not anticipated to impact access or any future planned uses. The Mecklenburg County Park and Recreation Department concurred that the estimated right of way needed under any of the DSAs would not adversely affect the activities, features, and attributes of Berewick Regional Park (Section 5.4.3.1 of the Draft EIS).

The Preferred Alternative refined preliminary design avoids taking right of way from Berewick Regional Park (**Section 2.3.1.12** and **Figure 2-3r**), and no further action under Section 4(f) is required.

Historic Architectural Sites. There are eighteen historic architectural resources listed on or eligible for listing on the NRHP located in the APE (Section 5.2.1.2 and Figure 5-1 of the Draft EIS). Because they are listed on or eligible for listing on the NRHP, they are considered significant historic sites under Section 4(f). Of these eighteen historic architectural resources, there are two historic architectural resources receiving a determination of No Adverse Effect as noted in the Draft EIS: JBF Riddle House and Harrison Family Dairy Farm.

There would be no land required from the JBF Riddle House or the Harrison Family Dairy Farm based on the refined preliminary design for the Preferred Alternative. As long as the conditions are met to maintain the No Adverse Effects determinations, there would be no use of these resources and no Section 4(f) evaluation is required.

Section 6(f) Resources. There are no Section 6(f) resources in the project study area.

2.5.4 NATURAL RESOURCES

2.5.4.1 Soils and Mineral Resources

Soils

The soils underlying the Preferred Alternative are rated by the US Department of Agriculture Natural Resource Conservation Service (NRCS) as "somewhat limited" or "very limited" for road construction. The expected soil limitations can be overcome through proper engineering design.

Soils. As discussed in **Section 1.3.4.1**, soils surveys for Gaston and Mecklenburg Counties were updated since the Draft EIS was published. A complete list of soils and soil properties can be found in **Appendix E**. The entire area underlain by the DSAs, including the Preferred Alternative, is rated "somewhat limited" or "very limited" for road construction. This means the soil properties indicate that special planning, design, or maintenance is needed to overcome soil limitations. The concern cited in the soil surveys is low strength (i.e., the soil is unable to support loads). Some soils also have shrink-swell potential, which is the potential for a soil volume to change with a loss or gain of moisture. Shrinking and swelling can cause damage to structures and roads, if either lack special design (USDA, January 1996).

The expected soil limitations can be overcome through proper engineering design, including the incorporation of techniques such as soil modification, appropriate choice of fill material, use of non-corrosive subgrade materials, and design of drainage structures capable of conveying estimated peak flows. Decisions regarding soil limitations and methods to overcome them would be determined during the final design phase.

Mineral Resources. None of the active or inactive mines permitted by the NCDENR Division of Land Resources described in Section 6.1.4 of the Draft EIS would be impacted by the DSAs, including the Preferred Alternative. Geotechnical surveys conducted during the final design phase would identify abandoned mine shafts in the area that could affect construction activities. It is expected that abandoned mine shafts can be accommodated in the final design and construction of the Preferred Alternative.

2.5.4.2 Water Resources

Existing water resources and water quality are discussed in **Section 1.3.4.2** and in Section 6.2.2 of the Draft EIS. The impacts discussion in Section 6.2.3 of the Draft EIS applies to the Preferred Alternative.

Water Quality Impacts and Mitigation. Short-term impacts on water quality within the project study area may result from soil erosion and sedimentation. Construction impacts to water quality may not be restricted to the communities in which the construction activity occurs, but may also affect downstream communities. Long-term impacts on water quality could be possible due to particulates, heavy metals, organic matter, pesticides, herbicides, nutrients, and bacteria often found in highway runoff.

Water Quality Mitigation

Impacts from erosion and sedimentation will be minimized by implementing control measures in accordance with NC DENR and NCDOT guidance and best management practices.

Indirect impacts to water quality also were evaluated in the *Quantitative Indirect and Cumulative Effects Analysis* (Louis Berger Group, Inc., August 2010) prepared for the Preferred Alternative. The results are summarized in **Section 2.5.5**.

Prior to construction, an erosion and sedimentation plan would be developed for the Preferred Alternative in accordance with applicable rules, regulations and guidance, including the latest versions of the NCDENR publication *Erosion and Sediment Control Planning and Design Manual,* the NCDWQ's *Stormwater Best Management Practices Manual* (July 2007), and NCDOT's *Best Management Practices for Protection of Surface Waters.*

Due to construction activities and the increase of impervious surface associated with the construction of a major highway, managing stormwater runoff is an important activity to reduce pollutant loads to adjacent streams. The NCTA would work with regulatory agencies to identify the best management practices (BMP) that would help ensure water quality is protected.

The *Standard Specifications for Roads and Structures* requires proper handling and use of construction materials (NCDOT, January 2002) (NCDOT Web site: www.ncdot.org/doh/preconstruct/ps/specifications/dual/). The contractor would be responsible for taking every reasonable precaution throughout the construction of the project to prevent the pollution of any body of water. The contractor would also be responsible for preventing soil erosion and stream siltation.

Water-Based Recreational Activities. As discussed in **Section 1.3.4.2**, boating, fishing, and waterskiing occur on the Catawba River and South Fork Catawba River, particularly in the areas south of the Allen Steam Station on the Catawba River and south of the Allen Steam Station canal on the South Fork Catawba River. Boat traffic on the South Fork Catawba River is constrained by the existing NC 273 (Armstrong Road) bridge over the river. This bridge's vertical

clearance over the river allows passage of pontoon boats and ski boats, but no large houseboats or sailboats (Telephone interview, Catawba Riverkeeper Foundation, September 4, 2008).

The Preferred Alternative would cross the rivers north of the Allen Steam Station, which are areas that are less navigable due to siltation. However, recreational activities likely would be temporarily affected during construction of the bridges.

Based upon the refined preliminary design for the Preferred Alternative, the vertical clearances of the bridges over the South Fork Catawba River and Catawba River would exceed the 12-foot minimum clearance above full pond elevation (569.4 MSL) required by Duke Energy Corporation in accordance with their Shoreline Management Guidelines (Duke Energy Corporation Web site: www.duke-energy.com/pdfs/shoreline_mgt_guide.pdf). These clearances would allow passage of recreational boats.

Catawba-Wateree Hydro Project. The NCTA would continue to coordinate with Duke Energy Corporation to obtain the necessary Federal Energy Regulatory Commission (FERC) permit. The process is expected to result in a FERC license revision to allow the transfer of land within the FERC project boundary to NCTA to construct the Gaston East-West Connector Preferred Alternative's bridges over Lake Wylie. This process must be complete prior to construction within the Lake Wylie boundaries and is included as a special project commitment (**Chapter PC**).

2.5.4.3 Natural Communities and Wildlife

Terrestrial Communities and Wildlife. Terrestrial communities would be impacted permanently by project construction from clearing and paving. **Table 2-12** provides the acreage of terrestrial communities by habitat type that would be impacted by the Preferred Alternative refined preliminary design, which includes proposed service roads. The acreages represent the area within the proposed right-of-way limits.

TABLE 2-12: Impacts to Terrestrial Communities

	Agricultural (acres*)	Clearcut (acres*)	Disturbed (acres*)	Hardwood Forest (acres*)	Pine Hardwood Forest (acres*)	Pine Forest (acres*)	Successional (acres*)	Open Water (acres*)	Total (acres*)
Preferred Alternative	152	20	537	195	445	152	111	19	1,631

Source: Natural Resources Technical Report for the Gaston East-West Connector (Earth Tech, Inc., February 2008)
*Acreage is within the refined preliminary design right of way limits within the area surveyed for natural communities. This does not include some service roads or areas of the design that extend outside the original study corridor boundaries. The majority of these areas are along existing roads or other disturbed areas.

As discussed in **Section 1.3.4.3**, direct impacts from the Preferred Alternative would occur to the terrestrial communities and to the animals that inhabit them. Destruction of natural communities along the Preferred Alternative right of way would result in the loss of foraging and breeding habitats for the various animal species that utilize the area.

Indirect impacts would occur from forest fragmentation. Indirect impacts to habitats also are discussed in **Section 2.5.5**. Forest fragmentation occurs when large, contiguous forests are divided into smaller patches by urbanization, roads, and agriculture.

When habitat is fragmented, the amount of edge habitat increases at the expense of interior habitat. Under these circumstances, species dependent upon interior habitat suffer (such as

many migratory or neo-tropical birds), while edge dependant species, including invasive species and predators, thrive. Highly fragmented forests do not provide the food, cover, or reproduction needs of interior forest species. The road itself could provide a physical barrier to the movement of mammals, reptiles, and amphibians along wildlife corridors and from one forest patch to another.

The impacts of habitat fragmentation could be reduced by providing connections between habitats on either side of the Gaston East-West Connector. In consultation with the NCWRC, USFWS, and USEPA, at a TEAC Meeting on April 8, 2008, the NCTA identified a location along all DSAs where wildlife passage structures could be provided to maintain habitat connectivity.

A wildlife passage structure would be studied at the crossing of Stream S156 during final design of the Preferred Alternative. Stream S156 (**Figure 2-3h**) is located between Forbes Road to the west and Robinson Road to the east. Wildlife passages often include additional culverts placed adjacent to the culverts needed for water passage. During final design, the NCTA would coordinate with the NCWRC, USFWS, and USEPA on the feasibility and design of the wildlife passage at Stream S156, and on designing bridge crossings to be wildlife friendly where feasible. This is included as a special project commitment in **Chapter PC**.

Wildlife Crossings

During final design, the NCTA would coordinate with the NCWRC, USFWS, and USEPA on the feasibility and design of the wildlife passage at Stream S156, and on designing bridge crossings to be wildlife friendly where feasible.

Aquatic Communities and Wildlife. Impacts to aquatic communities include fluctuations in water temperature as a result of the loss of riparian (forest) vegetation. Impacts to terrestrial communities, particularly in locations having steep to moderate slopes, could result in the aquatic community receiving heavy sediment loads as a consequence of erosion.

Construction impacts may not be restricted to the communities in which the construction activity occurs, but could affect downstream communities. The refined preliminary design for the Preferred Alternative reduced the number of streams crossed from 91 to 86, with six of these streams bridged (Crowders Creek, Blackwood Creek, Unnamed Stream 146, Catawba Creek, South Fork Catawba River, and Catawba River). Temporary and permanent impacts to aquatic organisms could result from increased sedimentation. Sediments have the potential to affect fish and other aquatic life in several ways including the clogging and abrading of gills and other respiratory surfaces, affecting the habitat by scouring and filling of pools and riffles, altering water chemistry, and smothering different life stages. Indirect impacts to water bodies are also discussed in **Section 2.6**.

As outlined in Section 6.2.3 (Mitigation of Impacts – Water Quality) of the Draft EIS, impacts to aquatic communities and wildlife from erosion and sedimentation would be minimized through implementation of a stringent erosion-control schedule and the use of BMPs.

Important Natural Areas. As described in Section 6.3.4 of the Draft EIS, there are three important natural areas within or near the DSAs: NCNHP Crowders Mountain State Park and Vicinity (**Figure 2-3 Index**), NCNHP Stagecoach Road Granitic Outcrop (**Figure 2-3f**), and Catawba Lands Conservancy conservation easement (**Figure 2-3l**). The Preferred Alternative refined preliminary design would not encroach on any of these natural areas.

Invasive Plant Species. Construction of the Preferred Alternative has the potential to provide opportunities for invasive plant species.

The NCTA would comply with Executive Order 13112. Known invasive plant species would not be used in construction, revegetation, or landscaping. During construction of the proposed project, BMPs would be implemented to reduce the potential for spreading invasive species.

2.5.4.4 Water Resources in Federal Jurisdiction

Impacts to Jurisdictional Resources.

Reductions in Jurisdictional Resource Impacts

The Preferred Alternative preliminary design refinements resulted in an approximately 25 percent reduction (2.36 miles) in stream impacts and a 6 percent reduction (0.4 acre) in wetland impacts compared to the DSA 9 preliminary design presented in the Draft EIS.

Table 2-13 presents the impacts to water resources for the Preferred Alternative. The impacts were calculated using the refined preliminary design estimated slope stake limits plus a 25-foot buffer, in accordance with NCDOT procedures. The values below include the service roads described in **Section 2.3.2**. Streams and wetlands proposed to be bridged are not counted as impacts. Impacts to streams and wetlands were reduced compared to the Draft EIS preliminary design for DSA 9, as described in **Section 2.3.3**.

TABLE 2-13: Impacts to Waters of the US

	Intermittent Stream Impacts (linear ft)[1]	Perennial Stream Impacts (linear ft)[1]	Total Stream Impacts (linear ft)[1]	Total Number of Stream Crossings	Wetland Impact Area (acres)[1]	Total Number of Wetlands Impacted	Pond Impact Area (acres)[1]
Preferred Alternative	7,383	29,033	36,416	87 (6 are bridges)	7.0	48	4.5

Source: Data in table was calculated using the refined preliminary design (January 2010) and GIS data for jurisdictional resources from the Natural Resources Technical Report for the Gaston East-West Connector (Earth Tech, Inc., February 2008) and surveys conducted for service roads and y-lines in November 2009.

[1] Impacts were calculated using the refine preliminary design construction limits, with an additional 25-foot buffer, in accordance with NCDOT procedures.

Appendix I includes tables listing each pond, wetland, and stream within the Preferred Alternative study corridor and the impacts by individual resource. Written verification of jurisdictional determinations for wetlands and streams from the NCDWQ is included in **Appendix K**. The USACE will provide written verification during the permitting process.

Impacts to Catawba River Buffers. Lake Wylie spans the Project Study Area and could not be avoided for any of the DSAs (including the Preferred Alternative). The refined preliminary design for the Preferred Alternative would impact Catawba River buffers for the crossings of Lake Wylie (Lake Wylie includes segments of Catawba River, South Fork Catawba River and Catawba Creek).

These crossings would be subject to the Catawba River Buffer Rules (15A NCAC 02B.0243). Road crossings that impact greater than 40 linear feet (lf), but equal to or less than 150 lf or one-third acre (14,505 square feet) of riparian buffer are allowable without mitigation. Road crossings that impact greater than 150 lf or one-third acre of riparian buffer are allowable with mitigation. These uses require prior written authorization from the NCDWQ.

Based on the refined preliminary design for the Preferred Alternative, the Preferred Alternative would impact 3,642 square feet of Zone 1 buffers and 8,859 square feet of Zone 2 buffers. The total impacts to buffers would be 12,501 square feet (0.28 acre). This is less than the threshold of one-third acre that requires mitigation.

During final design, the amount of buffer area required would be recalculated. Impacts less than one-third acre would still require, prior to construction, written authorization from the NCDWQ for disturbances to the buffer (15A NCAC 02B.0244).

Avoidance and Minimization. As discussed in Section 6.4.5.2 of the Draft EIS, the USEPA and USACE regulations governing wetlands mitigation embrace a policy of "no net loss of wetlands" and sequential consideration of avoidance, minimization, and mitigation.

For the preliminary designs shown in the Draft EIS, minimization efforts are discussed in Section 6.4.5.3 of the Draft EIS. The horizontal alignment of the preliminary designs was adjusted where possible to minimize or avoid impacts to streams, wetlands, and ponds. The presence of wetlands and streams, and the minimization or avoidance of impacts to these resources, were factors in considering interchange configurations.

Bridge lengths would be extended to maintain roadway and railway access adjacent to the Catawba River and South Fork Catawba River, which would avoid or minimize encroachment into Catawba River buffer areas.

To further address avoidance and minimization documented in the Draft EIS, the NCTA met with the environmental resource and regulatory agencies (USACE, NCDWQ, USFWS, USEPA, NCWRC) at TEAC Meetings on February 5, March 4, and April 8, 2008, to discuss bridging and alignment decisions for the DSAs' preliminary designs. In the NEPA/404 Merger Process (Draft EIS Section 9.2.3), this is Concurrence Point 2a – Bridging/Alignment Decisions.

As a result of those meetings, there were no changes to the alignments of any of the DSAs. However, the NCTA agreed to include several bridges in the preliminary designs, beyond those required to convey floodwaters (Draft EIS Section 4.7.3), to avoid or minimize stream and wetland impacts. These bridge locations for the Preferred Alternative include a bridge over Blackwood Creek (Stream S135) and the lengthening of the mainline bridge over Catawba Creek to span the main body of Wetland W248.

Impacts to wetlands and streams were further reduced through the design refinements made to the Preferred Alternative, even with inclusion of service roads, as described in **Section 2.3.3**. Specifically, the refined preliminary design for the Preferred Alternative resulted in an approximate 25 percent reduction in stream impacts (2.36 miles), an approximate 6 percent reduction in wetland impacts (0.4 acre), a slight increase in impacts to ponds (0.4 acre), and a slight decrease in Catawba River buffer impacts compared to the preliminary design for DSA 9 documented in the Draft EIS.

Compensatory Mitigation. As discussed in Section 6.4.5.4 of the Draft EIS and **Section 1.3.4.4**, an Individual Permit under Section 404 of the Clean Water Act would be required from the USACE for the Preferred Alternative's impacts to Waters of the US, along with an individual Section 401 Water Quality Certification.

As part of the mitigation strategy for the anticipated impacts to Waters of the US, a *Conceptual Mitigation Plan* (PBS&J, June 2010) has been prepared for the Preferred Alternative. This plan is incorporated by reference into this Final EIS and is available for review and download on the project Web site (www.ncturnpike.org/projects/gaston). The *Conceptual Mitigation Plan* provides a summary of mitigation requirements and several potential off-site and on-site mitigation components that may ultimately comprise the mitigation package for impacts to Waters of the US, including:

- Off-Site Mitigation. Assets available in the 8-digit hydrologic units (HUC) crossed by the Preferred Alternative for off-site mitigation credits to be provided by the North Carolina Ecosystem Enhancement Program (EEP).
- Off-Site Mitigation. Potential off-site mitigation sites closer to the Preferred Alternative in Gaston and Mecklenburg identified by EEP for potential future acquisition for mitigation credit.
- On-Site Mitigation. Traditional on-site mitigation opportunities identified for the Preferred Alternative (3 potential sites).
- On-Site Mitigation. Other on-site mitigation opportunities, including preservation and enhancement opportunities on the following types of parcels: 1) landlocked parcels that may be purchased by NCTA, 2) landlocked parcels that have a preliminary service road identified to provide access, 3) parcels with a portion of their area within the right-of-way but the remainder has existing access, and 4) nearby parcels that would need to be evaluated by EEP. In addition, non-traditional mitigation opportunities near the project were identified; including retrofitting storm water ponds for commercial/industrial areas and runoff collection ponds for residential curb-and-gutter communities that drain into streams without collection systems.

With the exception of the EEP mitigation assets already in hand in the 8-digit HUCs, the other potential mitigation resources listed in the *Conceptual Mitigation Plan* have not been acquired at this time. These other potential mitigation resources require additional evaluation, including an assessment of feasibility, more detailed determination of the amount of wetland or stream credits present on the potential site, and contact and buy-in with property owners. The total amounts of wetland and stream mitigation potentially available listed in this report should not be construed as the actual amounts that are feasible or that will be implemented for this project. This *Conceptual Mitigation Plan* serves to document that there are sufficient potential mitigation sites to cover the compensatory mitigation needs of the Gaston East-West Connector.

The NCTA and FHWA will work with the environmental resource and regulatory agencies during the permitting phase to further refine the mitigation plan for the project.

Wetland Finding. Executive Order 11990, Protection of Wetlands, and DOT Order 5660.1A, Preservation of the Nation's Wetlands, emphasize the important functions and values inherent in the Nation's wetlands. Federal agencies are directed to avoid new construction in wetlands unless there is no practicable alternative to such construction, and the proposed action includes all practicable measures to minimize harm to wetlands which may result from such use.

As discussed in **Section 2.2.2**, DSA 9 was selected as the Preferred Alternative because it represented a balanced minimization of all impacts analyzed. From a natural environment standpoint, DSA 9 was in the lower range of impacts to ponds, wetlands, and perennial streams, and had the fewest number of stream crossings.

Based on available data, the Preferred Alternative includes all practicable measures to minimized harm to wetlands. As discussed in **Section 2.3.3**, the refined preliminary design for the Preferred Alternative results in an approximately six percent reduction in wetland impacts (0.4 acre) compared to the preliminary design for DSA 9 documented in the Draft EIS.

Similarly, the on Clean Water Act Section 404(b)(1) Guidelines (40 CFR 230.10(a)), requires the evaluation of practicable alternatives to consider impact to Waters of the US that would result from an alternative before compensatory mitigation is considered, and requires the selection of an

alternative that avoids and minimizes impacts to wetlands and other waters of the US. The Section 404(b)(1) Guidelines require that the Least Environmentally Damaging Practicable Alternative (LEDPA) to aquatic resources be chosen for permitting purposes.

Based on impact evaluations, DSA 9 has been identified as the LEDPA, as discussed in **Section 3.2.3**. It is one of the three DSAs with the fewest impacts to jurisdictional resources and the one which provides the best overall balance of impacts when considering both jurisdictional and non-jurisdictional resources. DSA 9 was in the lower range of impacts to ponds, wetlands, and perennial streams, and had the fewest number of stream crossings.

2.5.4.5 Protected Species

The federally protected species listed for Gaston and Mecklenburg Counties are presented in **Table 1-7** in **Section 1.3.4.5**. These six species are described below, along with the Biological Conclusions (No Effect) regarding the effects of the Preferred Alternative on these species. There has been an update since the publication of the Draft EIS. Additional surveys for Schweinitz's sunflower were conducted for the Preferred Alternative, and these also are described below.

Based on their letter dated June 12, 2009, the USFWS concurs with the biological conclusions listed below. The letter is included in **Appendix B1**, letter a014.

Bald Eagle (*Haliaeetus leucocephalus*)

BIOLOGICAL CONCLUSION: NONE REQUIRED.

As discussed in Section 6.5.4.1 of the Draft EIS, three unoccupied large nests were observed outside of the DSAs during the bald eagle survey conducted December 19, 2006 (Section 6.5.3 of the Draft EIS). Two eagle nests have been documented on Lake Wylie by the NCWRC. There were no bald eagle nests within the DSAs. The closest known nest was approximately 1.6 miles north of the DSAs. Therefore, it is likely that eagles forage for fish within the Project Study Area.

Because the bald eagle is no longer listed as a threatened or endangered species, it is no longer protected under the Endangered Species Act, and a Biological Conclusion is not required. However, the eagle is still protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. The NCTA would continue to coordinate with the USFWS to ensure that applicable provisions within these two Acts are met.

Bog Turtle *(Clemmys muhlenburgii)*

BIOLOGICAL CONCLUSION: NONE REQUIRED

As discussed in Section 6.5.4.1 of the Draft EIS, potential habitat exists for this species in the Project Study Area. A search of the NCNHP database did not reveal any occurrences of the bog turtle within the Project Study Area. This species federal status is Threatened (Similarity of Appearance) and a Biological Conclusion is not required.

Carolina Heelsplitter (*Lasmigona decorata*)

BIOLOGICAL CONCLUSION: NO EFFECT

The surveys performed for the Carolina heelsplitter (Section 6.5.3 of the Draft EIS) applied to all DSAs. Freshwater mussels were not found in any of the surveyed streams: tributary to Abernathy Creek, Oates Creek, Bessemer Branch, tributaries to Crowders Creek, Crowders Creek, McGill Branch, Mill Creek, tributaries to Catawba Creek, Catawba Creek, tributaries to South Fork Catawba River, tributaries to Catawba River, and Beaverdam Creek. The NCNHP does not list any known populations up or downstream in any of the surveyed streams.

Michaux's Sumac (*Rhus michauxii*)

BIOLOGICAL CONCLUSION: NO EFFECT

Potential habitat for Michaux's sumac occurs throughout the DSAs. However, no populations of Michaux's sumac were found during the directed surveys. The NCNHP record for Michaux's sumac is historic, and nearly all of the area has been developed, farmed, and otherwise negatively impacted for suitable habitat. NCNHP records did not document the location of any known populations of the sumac within one mile of the DSAs. Based on the results of the field survey, the project would not directly or indirectly impact any Michaux's sumac populations within the area surveyed.

Smooth Coneflower (*Echinacea laevigata*)

BIOLOGICAL CONCLUSION: NO EFFECT

Habitat for the smooth coneflower is present in the Project Study Area. Suitable habitat for smooth coneflower within the DSAs was surveyed, but no populations of smooth coneflower were found. NCNHP records did not document the location of any known populations of the smooth coneflower within one mile of the DSAs. Based on the results of the field survey described in Section 6.5.3 of the Draft EIS, the project would not directly or indirectly impact the smooth coneflower within the area surveyed.

Schweinitz's Sunflower (*Helianthus schweinitzii*)

BIOLOGICAL CONCLUSION: NO EFFECT

Previous surveys for Schweinitz's sunflower in the DSA corridors are summarized in Sections 6.5.3 and 6.5.4.1 of the Draft EIS. One population of Schweinitz's sunflower was found within Corridor Segment K2A (DSAs 4, 22, 58, and 76) in Gaston County, and NCNHP documented a known population about 4,900 feet south of the DSAs in Gaston County.

Some of the service roads proposed for the Preferred Alternative, and some of the cross streets shown in the Draft EIS, are located outside the original study corridor boundaries for the DSAs. These areas outside the original DSA study corridor boundaries had not been previously surveyed for jurisdictional resources or protected plant species.

Surveys were conducted November 13, 17, and 18, 2009, for Schweinitz's sunflower in the portions of the Preferred Alternative preliminary design not previously surveyed (*Memo to NCTA – Endangered Species Surveys for Gaston East West Connector*, PBS&J, February 12, 2010, incorporated by reference).

Prior to the November 2009 surveys, a known population of Schweinitz's sunflower was visited in order to determine if there were enough vegetative indicators available to perform surveys and to become familiar with the species' morphology, phenology, and habitat associations. Approximately five individuals were observed at the site, which was sufficient to continue with the survey. Field surveys were conducted in potential suitable habitat by an intensive plant-by-plant search using overlapping transects.

2009 Survey Results. Three potential populations of Schweinitz's sunflower were located within the newly surveyed areas. These sites were revisited on February 12, 2010, to inspect the plants' roots. Schweinitz's sunflower has distinctive root characteristics. Based on this inspection, these populations were determined to not be Schweinitz's sunflower.

Planned Surveys. The Preferred Alternative study corridor is planned to be resurveyed for endangered plant species prior to the issuance of the Record of Decision (ROD) and the results

will be summarized in the ROD. Potential suitable habitat for Schweinitz's sunflower (Gaston County and Mecklenburg County), Michaux's sumac (Mecklenburg County), and smooth coneflower (Mecklenburg) will be surveyed.

2.5.5 INDIRECT AND CUMULATIVE EFFECTS

The Draft EIS includes a qualitative assessment of potential indirect and cumulative effects for the Detailed Study Alternatives. The qualitative *Indirect and Cumulative Effects Assessment for the Gaston East-West Connector* (Louis Berger Group, Inc., March 2009) was summarized in Chapter 7 of the Draft EIS.

A quantitative indirect and cumulative effects (ICE) study was prepared for the Preferred Alternative to expand on the previously prepared qualitative analysis. The *Gaston East-West Connector Quantitative Indirect and Cumulative Effects Analysis* (Louis Berger Group, Inc., August 2010) examines potential indirect and cumulative effects in more detail for the Preferred Alternative. This study is incorporated by reference and is posted on the NCTA website (www.ncturnpike.org). The study is summarized in the following sections.

2.5.5.1 Introduction and Background

Scenarios Evaluated. The No-Build Scenario and Build the Preferred Alternative Scenario (Build Scenario) were evaluated and compared to each other and to existing conditions. The Preferred Alternative used in the analysis is based on the refined preliminary design described in **Section 2.1**.

Definitions. As a guide to the evaluation of indirect effects and cumulative impacts under the National Environmental Policy Act (NEPA), the Council on Environmental Quality (CEQ) regulations and other relevant sources provide definitions of direct, indirect and cumulative effects:

Direct impacts are "caused by the action and occur at the same time and place. (40 CFR Part 1508.8)

Indirect effects are those effects that ". . . are caused by the action and are later in time and farther removed in distance, but are still reasonably foreseeable." Indirect effects "may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems."(40 CFR Part 1508.8(b)).

The North Carolina Department of Transportation (NCDOT)/Department of Environment and Natural Resources (NCDENR) *Guidance on Indirect and Cumulative Impact Assessment of Transportation Projects in North Carolina* (2001) outlines three types of indirect effects:

- *Encroachment-Alteration Effects* - alteration of the behavior and function of the affected environment caused by project encroachment (physical, chemical, or biological) on the environment.
- *Induced Growth Effects* - changes in the intensity of the use to which land is put that are caused by the action/project. These changes would not occur if the action/project does not occur. For transportation projects, induced growth is attributed to changes in accessibility caused by the project.
- *Induced Growth Related Effects* - alteration of the behavior and function of the affected environment attributable to induced growth.

Cumulative effects are "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time." (40 CFR Part 1508.7). According to the FHWA's *Interim Guidance: Questions and Answers Regarding the Consideration of Indirect and Cumulative Impacts in the NEPA Process* (2003), cumulative impacts include the total of all impacts to a particular resource that have occurred, are occurring, and will likely occur as a result of any action or influence, including the direct and reasonably foreseeable indirect impacts of a proposed project.

Study Process. The *Quantitative Indirect and Cumulative Effects Analysis* closely follows the 2001 guidance developed by NCDOT and NCDENR entitled *Guidance for Assessing Indirect and Cumulative Impacts of Transportation Projects in North Carolina, Volume II: Practitioner's Handbook* (November 2001), hereinafter referred to as *ICE Guidance*. The *ICE Guidance* provides the following eight steps that should be taken to assess indirect and cumulative effects:

Step 1: Definition of the Future Land Use Study Area (FLUSA)

Step 2: Identification of the FLUSA's Direction and Goals

Step 3: Inventory of Notable Features

Step 4: Identification of Important Impact-Causing Activities

Step 5: Identification and Analysis of Potential Indirect/Cumulative Effects

Step 6: Analyze Indirect/Cumulative Effects

Step 7: Evaluate Analysis Results

Step 8: Assess the Consequences and Develop Appropriate Mitigation and Enhancement Strategies

The eight step process is fully consistent with the CEQ's *Considering Cumulative Effects Under the National Environmental Policy Act* (1997). The previous qualitative *Indirect and Cumulative Effects Assessment for the Gaston East-West Connector* prepared for the Draft EIS focused on steps one through five of the eight-step process, and noted that the decision of whether or not an additional quantitative study was warranted would be made following the public review of the Draft EIS.

The analysis in the *Quantitative Indirect and Cumulative Effects Analysis* builds on the data, research and findings of the qualitative analysis to complete Steps 6 through 8 focused on the Preferred Alternative. The purpose of the *Quantitative Indirect and Cumulative Effects Analysis* is to: 1) provide a detailed analysis of the potential indirect land use, water resources, and wildlife habitat impacts of the Preferred Alternative; 2) provide a detailed analysis of the potential cumulative land use, water resources, and wildlife habitat impacts that could result from the combination of the direct and indirect impacts of the Preferred Alternative with the impacts of other reasonably foreseeable actions; and 3) to disclose mitigation measures that could be used to offset any adverse indirect and/or cumulative effects identified by the assessment.

In addition, the land use information developed for this study will be used to provide input to the water quality modeling expected to be conducted during the permitting process.

Scope of Study. The scope of the study and the environmental resources identified for analysis in the *Quantitative Indirect and Cumulative Effects Analysis* were selected based on consultation with and input from the environmental regulatory and resource agencies and review of comments

received on the Draft EIS during the public review period (**Appendix B**). Based on the input described below, resources/notable features identified for analysis in the quantitative ICE study included land use change, farmland (as a subset of land use change), water resources/water quality (including change in impervious surfaces), and wildlife habitat fragmentation.

Agency letters that mention the scope of the indirect and cumulative effects analysis are listed below, and the letters can be found in their entirety in **Appendix B1**.

- US Fish and Wildlife Service (USFWS) (letter a014 in **Appendix B1**), dated June 12, 2009. USFWS requests that water quality, habitat fragmentation, and land use change be addressed in an ICE analysis.
- US Environmental Protection Agency (USEPA) (letter a015), dated July 17, 2009. USEPA requests that a quantitative ICE be prepared addressing water quality, habitat fragmentation, land use change, and changes in impervious surfaces.
- NC Division of Water Quality (NCDWQ) (letter a004), dated June 30, 2009. NCDWQ states they will require a quantitative ICE analysis.
- NC Wildlife Resources Commission (NCWRC) (letter a005), dated July 7, 2009. NCWRC requests that water quality, wildlife habitat fragmentation, and land use change be addressed in the ICE analysis.
- NC Department of Agriculture (letter a013), dated June 8, 2009. The NC Department of Agriculture expresses concern regarding indirect and cumulative loss of farmland.

Letters submitted by local governments (**Appendix B2**) and interest groups (**Appendix B3**) and comments received from the public (**Appendices B4 through B7**) also were reviewed for input relating to the scope of the ICE study. No additional topics beyond those cited by the environmental resource and regulatory agencies listed above were identified.

Also, as listed in **Table 3-2** in **Section 3.2.1**, the scope of the quantitative study was discussed at Turnpike Environmental Agency Coordination (TEAC) meetings held on August 12 and September 8, 2009. One or both of these meetings were attended by the USEPA, US Army Corps of Engineers (USACE), USFWS, NCDWQ, and NCWRC. Issues identified at these meetings for analysis in the quantitative ICE assessment included land use change (including farmland as a subset of land use change), water resources/water quality, and habitat fragmentation.

2.5.5.2 Study Area and Analysis Year

Study Area. The study area boundaries used in the qualitative *Indirect and Cumulative Effects Assessment for the Gaston East-West Connector* were refined to encompass the entirety of Hydrologic Unit Code (HUC) 12-digit subwatersheds. The study areas used for the qualitative and quantitative studies are shown in **Figure 2-6.** The quantitative study area, referred to in this Final EIS as the ICE Study Area, consists of the following HUC 12-digit subwatersheds:

- Upper Crowders Creek (HUC 030501011501)
- Lower Crowders Creek (HUC 030501011504)
- Catawba Creek (HUC 0305010111502)
- Mill Creek – Lake Wylie (HUC 030501011505)
- Duharts Creek – South Fork Catawba River (HUC 030501020605)
- Lake Wylie – Catawba River (HUC 030501011406)

- Paw Creek – Lake Wylie (HUC 030501011404)
- Beaverdam Creek (HUC 030501011503)

Using the Metrolina Travel Demand Model, projected changes in travel times as a result of the project also were considered in refining the ICE Study Area boundaries. Traffic Analysis Zones (TAZ) are the geographic units used in travel demand models to organize land use data, as measured by households and employment. In order to summarize potential indirect and cumulative effects by watershed, a relationship between TAZ boundaries and watershed boundaries was established.

The ICE Study Area contains 124 TAZs in their entirety, plus portions of 138 additional TAZs around the fringes of the ICE Study Area. Most TAZs fell within one subwatershed, but some spanned multiple watersheds. For analysis purposes, the TAZs were split into new zones so that each zone corresponded to exactly one subwatershed and one Metrolina Model TAZ. Household and employment forecasts for the Metrolina Model TAZs were allocated proportionally to the new zones. For example, a new zone consisting of 25 percent of the land area of the original parent Metrolina Model TAZ was assigned 25 percent of the total households and employment of the parent TAZ. The assumption with this methodology is that future growth will be spread relatively evenly within each TAZ. This assumption is appropriate in the absence of information indicating the specific locations of new development and is unlikely to substantially affect the results for the study area as a whole.

Analysis Year. The future analysis year for the quantitative study is 2035 to coincide with applicable *2035 LRTPs* (MUMPO, GUAMPO, Rock Hill-Fort Mill Area Transportation Study [RFATS]). The previous analysis year for the qualitative *Indirect and Cumulative Effects Assessment for the Gaston East-West Connector* was 2030, because the LRTPs current at the time of that study had a horizon year of 2030.

2.5.5.3 Future No-Build Scenario Projects

As part of the cumulative impact analysis, impacts of other reasonably foreseeable transportation projects and land development attributable to population and employment growth were considered.

For purposes of cumulative environmental impacts, fiscally constrained projects with the potential to have environmental impacts (e.g. new alignment and widening projects) were identified from the 2035 LRTPs for the three MPOs with jurisdiction in the ICE Study Area (GUAMPO, MUMPO and RFATS). In addition, the South Carolina Department of Transportation's 2010-2015 STIP was reviewed to determine if additional project in York County outside the RFATS area needed to be considered in the assessment. Currently unfunded transportation projects included in the LRTPs were not considered reasonably foreseeable. Projects such as bridge replacement projects without widening, reconstruction of existing roadways without adding additional travel lanes, and the addition of turning lanes at intersections were not included because these types of projects would not affect the result of this study.

The projects included in the No-Build Scenario are shown in **Figure 2-7** and listed in **Table 2-14**. There were no projects outside the RFATs area in South Carolina listed in the *2010-2015 STIP* that are within the ICE Study Area.

TABLE 2-14: Transportation Projects Included in the No-Build Scenario

Project ID	Project Name	Description	Distance (Miles)*	Year
GUAMPO Projects				
U-5103	Titman-Cramerton Rd	Widen existing 2-lane road to 3 lanes and construct new 3-lane connector from NC 279 to US 29-74	2.6	2015
U-3425	Myrtle School Rd	Widen existing 2-lane road to 3 lanes from US 29-74 to Hudson Blvd	1.8	2015
U-2713	Linwood Rd	Widen existing 2-lane road to 3 lanes with some relocation from Crowders Creek Rd to US 29-74.	2.2	2025
7	NC 279 (South New Hope Rd)	Widen existing 2-lane road to 4-lane divided facility from titman Rd to Union New Hope Rd	3.8	2025
8	NC 274 (Union Rd)	Widen existing 2-lane road to 5 lanes and construct new 4-lane divided facility from Robinson Rd to Beaty Rd.	2.5	2025
14	US 29-74 South Fork Catawba River Bridge No. 82	Widen existing 4-lane bridge to 6 lanes and widen existing 4-lane facility to 6 lanes from Market St to Alberta St.	1.2	2025
11b	Belmont-Mt Holly Central Loop	Construct new 4-lane divided facility from US 29-74 to the Gastonia-Mt Holly Connector, or to the Belmont-Mt Holly Loop Link if the Gastonia-Mt Holly Connector not built.	4.3	2035
MUMPO Projects				
3311/ U-3411	West Blvd Ext	Construct new 2-lane road from Steele Creek Rd to I-485	0.66	2015
3312	West Blvd Ext	Widen to 4 lanes from Steele Creek Rd to I-485	0.66	2025
3157/ U-5116	Little Rock Rd	Relocate 4-lane facility from Flintrock Rd to NC 27 (Freedom Dr)	0.55	2015
22	Fred D Alexander Blvd	Construct new 4-lane road from NC 27 (Freedom Dr) to NC 16 (Brookshire Blvd)	1.88	2015
3003	NC 27 (Freedom Dr)	Widen existing 2-lane road to 4 lanes from Edgewood Rd to Toddville Rd	1.5	2015
502	Dixie River Rd / NC 160 Connector	Construct new 2-lane road from NC 160 to Dixie River Rd	1.3	2015
RFATS Projects				
--	Pole Branch Rd	Widen existing 2-lane road to 3 lanes from SC 274 to the NC/SC Stateline	2.4	2035

Source: Gaston East-West Connector Quantitative Indirect and Cumulative Effects Analysis, Louis Berger Group, Inc., August 2010.
* Distance listed is the total distance cited in the LRTP project descriptions. The portions of these projects outside the ICE Study Area were not included in the cumulative effects assessment.

2.5.5.4 Land Use Forecasting Methodology

This section explains the methodology used to analyze future land use change in the ICE Study Area. The assessment of the Build condition is based on the TAZ demographic projections prepared by the MPOs included in the Metrolina travel demand model area. The No-Build condition is estimated using a gravity model approach that reallocates household and employment growth based on relative accessibility changes. Household and employment projections at the TAZ level are converted into changes in land use based on the average density of proposed or existing development in the ICE Study Area.

Household and Employment Forecasts. The Metrolina travel demand model includes all of Gaston County, Mecklenburg County, York County (SC), Union County, Cabarrus County,

Rowan County, Lincoln County, and Stanly County. It also includes portions of Iredell County, Cleveland County, and Lancaster County (SC). TAZ-level demographic projections in the Metrolina travel demand model for the ICE Study Area were developed by GUAMPO, MUMPO and York County/RFATS.

As explained in GUAMPO's *2035 LRTP*, a regional socioeconomic development committee was formed to develop the previous 2030 forecasts. This committee, along with the assistance of the University of North Carolina at Charlotte's Urban Land Institute, developed a methodology utilizing economic forecasts, local building permit trends, census data, and local land development knowledge such as current and future land use, utility improvements, economic development potential, and land availability. The 2030 socioeconomic forecasts were compiled through the use of an expert panel; comprised of local planners, real estate representatives, economic developers, and utility providers.

For the 2035 LRTPs covering the ICE Study Area, updated forecasts were prepared by GUAMPO, MUMPO, and the York County Department of Planning and Development.

A series of interviews was conducted with the MPOs and county planning departments in the ICE Study Area to determine whether the updated 2035 forecasts should serve as the No-Build Scenario or the Build Scenario for this study. Interviews were held with planners from GUAMPO, MUMPO, RFATS, Gaston County, Mecklenburg County, and York County. All three of the MPOs with responsibility for developing the demographic forecasts for the ICE Study Area confirmed that the Gaston East-West Connector was assumed to be completed in the allocation of future growth to specific zones.

During the demographic forecasting efforts for the Metrolina travel demand model, additional growth was added in areas that were expected to become more attractive to development with the project, including southern Gaston County and northern York County. This means that the indirect land use effect of the project is already reflected in the demographic forecasts. Therefore, the Metrolina travel demand household and employment forecasts should be used to represent the Build Scenario. All the interviewees concurred that the household and employment forecasts represent the Build Scenario and it was reasonable to use a gravity model approach to redistribute households and employment for the No-Build Scenario.

An interchange at Bud Wilson Road was originally proposed, and would have been considered as part of the project when the demographic forecasting was being conducted for the 2035 LRTPs. The Preferred Alternative does not include this interchange. However, this change does not have the potential to substantially alter the results of the quantitative indirect and cumulative effects assessment. The removal of the Bud Wilson Road interchange would not change the estimated basic pattern of the growth forecasts because numerous other interchange remain part of the design of the Preferred Alternative. The land around Bud Wilson Road has the potential to become more attractive to development even without an interchange because Bud Wilson Road can be accessed from other roads that do connect to the Gaston East-West Connector.

Gravity Model Methodology. The version of the gravity model used for this study was presented by Hirschman and Henderson in the 1990 Transportation Research Record article, *Methodology for Assessing Local Land Use Impacts of Highways*. One important limitation on the gravity model used is that there is no constraint on the growth a zone can experience. To address this limitation, a separate analysis of developable land was performed for the TAZs comprising the ICE Study Area, and the household and employment allocations for certain TAZs were reduced based on the expectation that build-out conditions would occur.

Gravity models are often used in transportation and travel modeling. They are based on the observation that the overall attractiveness of an area to potential residents is a function of the capacity of an area for development (i.e., vacant developable land in valued and affordable locations) and accessibility to employment and activity centers, among other things. The model produces quantified results that can serve as a basis for assessing land use change.

Accessibility of places can have an impact on land value, and hence the use to which land is put. Holding all other factors constant, the gravity model formulation assumes that areas where accessibility increases as a result of a transportation project will be relatively more attractive for development than if the project had not been built. However, it should be noted that studies have found that the effect of highways on land prices has been diminishing over time since early studies of the first segments of the interstate system in the 1950s. Incremental improvements in areas that already possess highway access have reduced the magnitude of the influence of highway on land development activity and the land use effects of modern highway projects likely operate over a fine geographic scale, close to the project (*Do Highways Matter? Evidence and Policy Implications of Highways Influence on Metropolitan Development*. Marlon Bournet and Andrew Haughwout of The Brookings Institution Center on Urban and Metropolitan Policy, 2000).

While accessibility changes are a necessary condition for transportation improvement to influence land development, they are not sufficient to stimulate land use change in the absence of other conditions supportive of such development. Other factors influencing the likelihood of regional development shifts include: land availability and price, state of the regional economy, infrastructure, location attractiveness and amenities, local political/regulatory conditions, and land use controls.

Method for Estimating Existing Land Use. Mapping of existing land use in the ICE Study Area was developed based on GIS parcel data for Gaston, Mecklenburg, and York Counties, combined with spot checking against 2009 orthophotography. Three basic categories of land use were delineated:

- Residential (development associated with households)
- Commercial, industrial, office, schools, and government institutions (development associated with employment)
- All other lands (e.g., agriculture, vacant, and transportation right of way)

Method for Estimating Future Land Use. In order to assess land use changes and potential impacts on environmental resources resulting from future development, it was necessary to convert the No-Build Scenario and Build Scenario household and employment projections into estimates of land use change.

Direct land conversion resulting from the Preferred Alternative was accounted for using the Preferred Alternative refined preliminary design right-of-way boundaries.

The acreage of land that would be converted to residential-related uses in the future was projected based on density information from a GIS database of 44 approved developments in Gaston County provided by the Gastonia City Planning Department. The database includes developments in the vicinity of the project.

A comparable database of recent commercial and industrial developments was not available for the purpose of making projections about employment density. Therefore, the existing density of

employment was calculated based on the ICE Study Area employment estimates for 2005 and the area of land devoted to commercial, industrial or institutional uses.

As mentioned previously, the gravity model formulation used to reallocate households and employment based on changes in accessibility did not include any cap on the amount of development that could occur in any one TAZ. To account for development constraints in the TAZ-level household and employment allocations for the ICE Study Area, an analysis of buildable land by zone was conducted. Development constraints included existing roads, existing developed land, National Wetland Inventory wetlands, surface waters (rivers, streams, and lakes), Catawba River/Lake Wylie buffers, 100-year floodplains, and conserved lands.

The result included a reduction in the amount of household and employment growth in certain zones under both the No Build and Build Scenarios. As such, the total buildable land area for that zone would not be exceeded.

2.5.5.5 Methods for Assessing Notable Features/Resources

Water Resources. Impervious surface cover is an accepted indicator for assessing the potential for water quality impact as a result of future development. Numerous studies have found that first order to third order streams with watersheds exceeding 10 percent impervious surface cover exhibit impacted stream quality. Streams with watersheds exceeding 25 percent impervious surface cover typically exhibit degraded conditions and often do not meet water quality standards (*Impacts of Impervious Cover on Aquatic Systems*, Center for Watershed Protection, 2003).

Existing impervious surface cover in the ICE Study Area was assessed using Feature Analyst, a GIS program. The resulting data was then manually edited based upon review of 2009 aerial photography.

To project future growth in impervious surface cover for the No-Build and Build Scenarios, percent impervious surface factors from the Natural Resource Conservation Service (NRCS) TR-55 Manual were used. A factor of 30 percent was used for residential development and a factor of 70 percent was used for employment-related development.

Impervious surface cover associated with the No-Build Scenario transportation projects was estimated based on the length of the project and the number of new travel lanes specified in the LRTPs for the ICE Study Area. Impervious surface cover associated with the Preferred Alternative right of way was estimated to consist of 34.3 percent impervious cover based on the proposed typical section and right-of-way width.

Wildlife Habitat. Forest cover and the size and configuration of undisturbed habitat blocks are key indicators for assessing potential upland wildlife habitat impacts. As with the impervious surface cover, existing tree cover was defined using Feature Analyst and reviewed using 2009 aerial photography. No manual post-processing was needed, as the program provided a reasonable representation of tree cover. Also, note that the existing tree cover estimates included street trees in urban area.

A range of potential impacts of future development on tree cover was estimated in order to appropriately reflect the uncertainty involved in predicting the exact locations of future development. The low estimate of potential tree cover impacts assumed that development would be prioritized away from forested areas. The high estimate of tree cover impacts assumed that future land conversion would occur in forested area first, and would only affect non-forested area when all the unconstrained forest cover in a zone was developed. In actuality, future

development of forested areas likely will be closer to the low end of the range than the high end because deforested areas are typically preferred for development.

In addition to tree cover impact assessment, an analysis was performed to identify interior forest habitat and assess the direct impacts and indirect edge effects of the Preferred Alternative. When interior forest and/or grassland habitat areas are converted to edges as a result of fragmentation, several types of indirect effects can occur. These may include increased penetration of light and wind into the forest and establishment of invasive plants and other competing and predatory species. As a result of edge effects, fragmentation of larger blocks of forest has been shown to cause a decrease in forest interior dwelling species, but the extent of edge effects varies considerably between different species and across habitat types.

For analysis purposes, an edge effect distance of 300 feet was selected for this study to identify potential interior forest habitat areas. An edge effect distance of 300 feet is supported by literature and has been used for other transportation project NEPA evaluations (e.g., Intercounty Connector Final EIS, Maryland DOT). For existing conditions in the ICE Study Area, an edge effect zone of 300 feet was created around existing roadways, development, and other open areas (waterbodies, agricultural fields, etc). The edge effects of the Preferred Alternative were superimposed on the existing conditions mapping to determine the incremental increase in edge effects and habitat fragmentation impacts.

The potential impacts of future household and employment growth on forest interior habitat was not assessed quantitatively due to the uncertainty involved in predicting the exact spatial arrangement of development, which is key to determine the size of future edge effects. Fragmentation impacts from future growth were qualitatively considered in light of the range of tree cover impacts.

Farmland. As a subset of land use change, indirect and secondary impacts to farmland were considered for analysis. Farmland is important as an industry, as open space and as a wildlife habitat for certain species (e.g. grassland birds). The US Census of Agriculture data for the area of land in farms in 1987 and 2007 are summarized by county below.

- Gaston County. 37,561 acres in 2007, compared to 40,937 acres in 1987 (a decrease of 3,376 acres or 8.2 percent).
- Mecklenburg County. 19,135 acres in 2007, compared to 35,929 acres in 1987 (a decrease of 16,794 acres or 46.7 percent).
- York County. 124,176 acres in 2007, compared to 128,718 acres in 1987 (a decrease of 4,542 acres or 3.5 percent).

Within Gaston County, many of the agricultural areas are located in the northern portions of the county that have not experienced substantial development pressures. Therefore, the existing proportional loss of farmland in southern Gaston County is likely greater than the county-level Census of Agriculture data suggest due to suburban residential development associated with the growth of Charlotte. A Voluntary Agricultural District program began in Gaston County in 2004 with the objective of protecting and conserving the agricultural open space.

Farmland was not ultimately selected as a resource for detailed analysis because farmland is not a major land use throughout most of the ICE Study Area, and there are methodological issues with distinguishing active farmland from other types of open undeveloped land based on aerial photography. However, some indication of the potential for impacts to agricultural land in the future can be obtained by review of the projected land conversion associated with household and

employment growth. Specific impacts to agricultural lands will depend on the decisions of individual land owners as influenced by land prices and the economics of farming.

In addition to Gaston County's existing Voluntary Agricultural District Program, farmland conservation policies that could be considered by local governments include agricultural protection zoning, cluster developments, conservation easements, farmland mitigation requirements, and Transfer of Development Rights (TDR) (Farmland Protection Toolbox, Web site at www.farmlandinfo.org/documents/27761/fp_toolbox_02-2008.pdf).

2.5.5.6 Potential Indirect and Cumulative Effects to Land Use

Analysis Limitations. Attempts to forecast future growth or development have inherent limitations on the accuracy and certainty of the results. The land use forecasts described below were developed using recommended methods as described in the NCDOT *ICE Guidance*, and they rely on the planning organizations in the ICE Study Area. Therefore, the results are only as accurate as those forecasts. The quantities of projected development also rely on assumptions about development density, and these assumptions are another limitation on the accuracy of the analysis. Thus, the process of developing forecasts induces uncertainty. The exact level of uncertainty is not possible to quantify.

In addition to assumptions about the quantities of future development, the analysis also requires assumptions about the distribution of future development to individual TAZs. The purpose of producing the quantified scenarios is to gain an understanding of the incremental effects of the proposed action (i.e., indirect effects) as well as the overall cumulative effects to the environment across the ICE study area. Consequently, assumptions made about the distribution of land use follow a logical construct but are not necessarily accurate. In other words, the analysis is a product of assumptions that allow reasonable estimates and comparisons to be made, but in doing so, the actual projected distribution of development is generalized according to those assumptions and does not replicate the unknown individual private land use decisions of the future.

All results described below have been rounded to the nearest 100 acres, based on the uncertainty associated with predicting the location and density of future household and employment growth and consideration for the varying resolutions of the input GIS data.

Household and Employment Growth. Results of the gravity model assessment of shifts in the locations of household and employment growth for the ICE Study Area are shown in **Table 2-15** and on the following figures:

- **Figures 2-8 and 2-9**. Household and employment growth by zone from 2005 to 2035 under the No-Build Scenario.
- **Figures 2-10 and 2-11**. Household and employment growth by zone from 2005 to 2035 under the Build Scenario.
- **Figures 2-12 and 2-13**. Change in household and employment from the 2035 No-Build Scenario to the 2035 Build Scenario.

TABLE 2-15: Gravity Model Estimated Change in Households and Employment by Watershed – No-Build Scenario and Build Scenario

Watershed	2005	2035 No-Build Scenario	2035 Build Scenario	No-Build to Build Difference	Percent Difference
Households					
Beaverdam Creek-Catawba River	1,800	2,700	3,100	400	14.8%
Catawba Creek	15,000	22,000	23,800	1,800	8.2%
Duharts Creek-South Fork Catawba River	12,700	22,700	22,700	-100	-0.4%
Lake Wylie-Catawba River	2,600	6,600	6,700	200	3.0%
Lower Crowders Creek	6,600	11,200	12,500	1,300	11.6%
Mill Creek-Lake Wylie	3,100	6,800	7,200	400	5.9%
Paw Creek-Lake Wylie	7,300	11,800	11,700	0	0%
Upper Crowders Creek	11,300	18,800	18,500	-300	-1.6%
Total Households	**60,300**	**102,500**	**106,200**	**3,700**	**3.6%**
Employment					
Beaverdam Creek-Catawba River	1,700	2,500	2,900	300	12.0%
Catawba Creek	10,700	12,900	13,300	400	3.1%
Duharts Creek-South Fork Catawba River	21,400	27,500	27,400	-100	-0.4%
Lake Wylie-Catawba River	3,500	8,700	8,300	-400	-4.6%
Lower Crowders Creek	2,300	3,200	3,600	300	9.4%
Mill Creek-Lake Wylie	1,700	4,000	4,000	100	2.5%
Paw Creek-Lake Wylie	10,100	18,400	18,300	0	0%
Upper Crowders Creek	7,000	14,300	13,400	-900	-6.3%
Total Employment	**58,400**	**91,500**	**91,200**	**-300**	**-0.3%**

Source: Gaston East-West Connector Quantitative Indirect and Cumulative Effects Analysis, Louis Berger Group, Inc., August 2010.
Note: Results have been rounded to the nearest 100 households and 100 employees. Differences were calculated prior to rounding.

Up to 3,700 additional households and 300 fewer jobs are anticipated in the ICE Study Area as a result of the indirect development shifts associated with the project. This is not new growth, but rather represents households and employment that would have located elsewhere in the Metrolina region under the No-Build Scenario. At the regional scale, household and employment totals remain constant between the No-Build and Build conditions. The overall indirect effect of the project for the ICE Study Area as a whole is relatively small in comparison to the growth in households (42,200) and employment (33,100) expected between 2005 and 2035 under the No-Build Scenario. For households, the difference is a 3.6 percent increase from the No-Build Scenario to the Build Scenario. For employment, the projected difference between the No-Build Scenario and Build Scenario is 0.3 percent, or approximately no change.

The largest increase in households and employment attributed to the proposed project would be in the Catawba Creek subwatershed, while the largest percentage change from the No-Build Scenario to the Build Scenario is projected for the Beaverdam Creek subwatershed. Note that for the subwatersheds showing a "decrease" from the No-Build Scenario to the Build Scenario, this represents a decrease in future growth, not a decrease relative to existing conditions. For example, the forecasts for the Upper Crowders Creek subwatershed show 2035 employment under the Build Scenario as 900 jobs, or 6.3 percent less than the No-Build Scenario. However,

even under the Build Scenario, the Upper Crowders Creek subwatershed is expected to experience growth in employment of 6,400 (a 90 percent increase) between 2005 and 2035.

Several of the zones with the largest household growth expected under the No-Build Scenario are adjacent to Lake Wylie or the South Fork Catawba River, a pattern consistent with recent trends and developments (**Figure 2-8**). The same general patterns in household growth would occur under the Build Scenario (**Figure 2-10**). Concentrations of substantial employment growth under both the No-Build Scenario and Build Scenario include the general areas around the Bessemer City industrial park and around the Charlotte-Douglas International Airport, which is located northeast of the proposed interchange between the Gaston East-West Connector and I-485 (**Figures 2-9 and 2-11**).

Relative to the No-Build Scenario, the Build Scenario would generally increase growth in the zones along the Preferred Alternative alignment in southern Gaston County and also in northern York County (**Figures 2-12 and 2-13**). These areas would experience an increase in relative accessibility that would, all other factors held constant, make these zones more attractive for development as a result of the project. Areas along the I-85 corridor would not experience as large of an accessibility improvement and, as a result, show less growth under the Build Scenario than under the No-Build Scenario. The gravity model formulation shifts households and employment towards those areas with the greatest accessibility (travel time) improvements.

Land Use Change. Based on the projected changes in households and employment described previously, the indirect land use effect of the project is an approximately 1.5 percent increase in the total area of residential land and a 0.4 percent decrease in employment-related land in the ICE Study Area. The largest absolute difference in land conversion between the No-Build and Build Scenarios is projected for the Catawba Creek subwatershed. **Table 2-16** present the residential and employment related land use change estimates by watershed based on the gravity model output, as described in **Section 2.5.5.4**.

TABLE 2-16: Estimated Land Conversion by Watershed – No-Build Scenario and Build Scenario

Watershed	Total Area (Acres)	Existing Residential Land (Acres)	2005-2035 No Build Land Conversion (Acres)	2005-2035 Build Land Conversion (Acres)	No Build to Build Difference (Acres Rounded to Nearest 10)	Percent Change in Total Residential Land, No Build to Build
Estimated Residential Land Conversion						
Beaverdam Creek-Catawba River	12,200	5,200	300	400	100	1.8%
Catawba Creek	20,700	10,500	2,300	2,900	600	4.7%
Duharts Creek-South Fork Catawba River	25,300	9,700	3,400	3,300	0	-0.8%
Lake Wylie-Catawba River	10,500	3,000	1,300	1,400	100	2.3%
Lower Crowders Creek	36,700	16,700	1,500	2,000	400	2.7%
Mill Creek-Lake Wylie	15,000	6,800	1,200	1,400	100	2.5%
Paw Creek-Lake Wylie	11,900	4,100	1,500	1,500	0	0%
Upper Crowders Creek	26,500	10,800	2,500	2,400	-100	-0.8%
Total	**158,800**	**66,900**	**14,100**	**15,300**	**1,200**	**1.5%**

TABLE 2-16: Estimated Land Conversion by Watershed – No-Build Scenario and Build Scenario

Watershed	Total Area (Acres)	Existing Residential Land (Acres)	2005-2035 No Build Land Conversion (Acres)	2005-2035 Build Land Conversion (Acres)	No Build to Build Difference (Acres Rounded to Nearest 10)	Percent Change in Total Residential Land, No Build to Build
Estimated Employment-Related Land Conversion						
Beaverdam Creek-Catawba River	12,200	700	200	300	100	11.1%
Catawba Creek	20,700	2,700	600	800	200	6.1%
Duharts Creek-South Fork Catawba River	25,300	3,600	1,700	1,700	0	0%
Lake Wylie-Catawba River	10,500	1,800	1,500	1,400	-100	-3.0%
Lower Crowders Creek	36,700	1,300	300	400	100	6.3%
Mill Creek-Lake Wylie	15,000	300	700	700	0	0%
Paw Creek-Lake Wylie	11,900	3,300	2,400	2,400	0	0%
Upper Crowders Creek	26,500	3,100	2,100	1,800	-300	-5.8%
Total	**158,800**	**16,700**	**9,500**	**9,400**	**-100**	**-0.4%**

Source: Gaston East-West Connector Quantitative Indirect and Cumulative Effects Analysis, Louis Berger Group, Inc., August 2010.
Note: Results have been rounded to the nearest 100 acres. Differences were calculated prior to rounding.

It should be noted that the estimates of existing condition residential and employment related land acreages are based on parcel data. The changes in acreages for these land use types estimated for 2035 under either the No-Build Scenario or Build Scenario did not account for the possibility that some larger parcels already classified as residential or employment related could be subdivided to accommodate some portion of the projected growth, and therefore acreage changes would be less.

Consistency with Local Land Use Plans. The substantial growth projected for the southeast portion of Gaston County (including the indirect land use effects of the proposed project) is largely consistent with local plans for Gaston County. Gaston County's *2002 Comprehensive Plan* (November 2002) shows the areas surround the Gaston East-West Connector interchanges with US 321 and NC 279 as development target areas where future growth should be directed. In addition, bypass-dependent development target areas shown at several other interchanges along the corridor. Gaston County's Unified Development Ordinance will be essential in ensuring that form of new developments match local planning objectives for compact, mixed-use developments that preserve open space.

For Mecklenburg County, the analysis results show that the proposed project does not substantially change the household and employment levels for the portion of Mecklenburg County within the ICE study area. This overall result was consistent with the expectations of Mecklenburg County planners interviewed as part of this study. As a result, the potential for inconsistency with local plans for Mecklenburg County is low. The additional growth expected with the project on the north side of the interchange with Dixie River Road is consistent with the *Dixie Berryhill Strategic Plan* for the development of this area (Charlotte-Mecklenburg Planning Department, 2003).

York County's *2025 Comprehensive Plan* (April 2004) calls for rural residential and agricultural land use in the northern portions of the county within the ICE study area, with concentrations of commercial and industrial land use along the US 321 corridor. There is potential for the substantial growth pressures without the proposed project (the No-Build Scenario household and employment estimates) to be inconsistent with the objective of maintaining a primarily rural character in this area. The additional growth in this portion of York County with the proposed project would incrementally add to this potential inconsistency.

The priority recommendations of the York County *2025 Comprehensive Plan* are currently being implemented with an Interim Development Ordinance while a Unified Development Ordinance is developed. In addition to the potential for changes in requirements for new developments under a Unified Development Ordinance, growth in northern York County will also be strongly influenced by the provision of utilities to new developments. In interviews conducted for this study, York County planners indicated that some utility providers would be acquired by the county and it was uncertain whether county ownership would increase or decrease the expansion of water and sewer service areas.

2.5.5.7 Potential Indirect and Cumulative Effects to Water Resources

Existing Water Quality. Existing water quality is discussed in Section 6.2.2 of the Draft EIS and in **Section 1.3.4.2** of this Final EIS. Several segments of Crowders Creek and Catawba Creek are listed as impaired for aquatic life support, with the impairment likely due to impacts from urban stormwater runoff and waste water treatment systems. A fecal coliform Total Maximum Daily Load (TMDL) was established for Crowders Creek in 2004 (NCDWQ).

Lake Wylie was formerly listed as impaired for nutrients and a TMDL was established in 1991. As of the 2010, the main body of Lake Wylie within the ICE study area is in attainment with water quality standards. However, the South Fork Catawba River arm of the lake is impaired for aquatic life support based on copper concentrations and high temperature. Lake Wylie is also listed as impaired for copper in South Carolina, and the Catawba Creek arm of Lake Wylie is impaired for recreational uses by fecal coliform.

In York County, Beaverdam Creek is listed as impaired for aquatic life support based on turbidity and macroinvertebrate community conditions. The primary source of the fecal coliform impairment was identified as runoff from grazed pasture lands. A TMDL for fecal coliform was established in the Beaverdam Creek watershed in 2001.

Stormwater Management Policies. Authorized by the Clean Water Act, the National Pollutant Discharge Elimination System (NPDES) permit program regulates pollutant discharges with the goal of protecting water quality. The program is overseen by USEPA, and is generally implemented by the states.

The City of Charlotte received a Phase I NPDES stormwater permit in 1993. In 2005, the remainder of Mecklenburg County outside the city limits of Charlotte was issued a Phase II NPDES permit. Gaston County and York County are both designated NPDES Phase II areas an have established local requirements for the stormwater treatment aspects of proposed developments.

Riparian Buffer Policies. Riparian buffers are vegetated lands adjacent to streams. The loss of riparian buffers can reduce water quality. Permanent riparian buffer protection rules were enacted by North Carolina for the main stem of the Catawba River and its main stem lakes below

Lake James (including Lake Wylie) (15 NCAC 02B.0243-0244). The buffer protection rules apply within 50 feet of the riparian shorelines. Section 6.4.2 of the Draft EIS provides more information.

The City of Charlotte and Mecklenburg County have initiated stream buffer ordinances through the Charlotte-Mecklenburg Surface Water Improvement & Management (SWIM) Program. There are three buffer sizes (35 ft, 50 ft, and 100 ft), depending on the size of the drainage.

In 2009, York County adopted a riparian buffer policy applicable to the shoreline of Lake Wylie and the Catawba River, as well as perennial streams draining to the Catawba River. A 50-foot buffer zone is established for Lake Wylie and perennial streams, and a 100-foot buffer zone is established for the Catawba River.

Existing Percent Impervious Cover. Based on 2007 conditions, approximately 12.5 percent of the ICE Study Area consists of impervious surface cover. Beaverdam Creek, Upper Crowders Creek, and Lower Crowders Creek subwatersheds on the western side of the ICE Study Area consist of less than 10 percent impervious surface cover. The Paw Creek and Lake Wylie-Catawba River subwatersheds on the eastern side of the ICE Study Area exhibit the highest percent impervious cover at over 20 percent. The remaining watersheds in the study area have a percent impervious cover within the range of 10 to 20 percent.

Impacts from Other Actions (No-Build Scenario). **Table 2-17** lists the change in impervious surface cover by watershed, including the change from 2007 to the 2035 No-Build Scenario.

TABLE 2-17: Estimated Change in Impervious Cover by Watershed

Watershed	Total Watershed Area (Acres)	2007 Impervious Cover (Acres)	2035 No Build Impervious Cover (Acres)	2035 Build Impervious Cover (Acres)*	2007 Percent Impervious Cover	2035 No Build Percent Impervious Cover	2035 Build Percent Impervious Cover*
Beaverdam Creek	12,000	700	1,000	1,100	5.7%	8.2%	9.0%
Catawba Creek	20,700	3,700	4,800	5,200	17.9%	23.2%	25.1%
Duharts Creek-South Fork Catawba River	25,300	4,600	6,900	6,900	18.2%	27.3%	27.3%
Lake Wylie-Catawba River	10,500	2,200	3,600	3,700	21.6%	34.3%	35.2%
Lower Crowders Creek	36,700	2,100	2,800	3,100	5.7%	7.6%	8.4%
Mill Creek-Lake Wylie	15,000	1,600	2,400	2,500	10.7%	16.0%	16.7%
Paw Creek-Lake Wylie	11,900	3,300	5,400	5,400	27.7%	45.4%	45.4%
Upper Crowders Creek	26,500	1,600	3,800	3,700	6.0%	14.3%	14.0%
Study Area Total	**158,800**	**19,800**	**30,700**	**31,500**	**12.5%**	**19.3%**	**19.8%**

Source: *Gaston East-West Connector Quantitative Indirect and Cumulative Effects Analysis*, Louis Berger Group, Inc., August 2010.
Note: Results have been rounded to the nearest 100 acres. Differences were calculated prior to rounding.
* Includes cumulative effect of past actions (existing conditions), the impacts of reasonably foreseeable actions by others (future household and employment growth and other transportation projects), the indirect effects of the project and the direct increase in impervious surface cover resulting from the project.

Future development under the No-Build Scenario is expected to increase impervious surface cover by over 10,000 acres compared to existing conditions for the ICE Study Area as a whole. Approximately 90 acres of the No-Build Scenario increase in impervious cover is attributed to other specific transportation projects, with the majority associated with household and employment growth. Overall, impervious surface cover in the ICE Study Area is projected to

increase 6.8 percent, from 12.5 percent under existing (2007) conditions to 19.3 percent under the No-Build Scenario. Several watersheds would exceed thresholds that suggest the potential for stream and water quality impacts as a result of development under the No-Build Scenario. The percent impervious surface cover in the Upper Crowders Creek subwatershed would increase from 6.0 percent to 14.0 percent. Three subwatersheds which currently have less than 25 percent impervious cover would approach or exceed 25 percent impervious cover under the No-Build Scenario: Catawba Creek, Duharts Creek-South Fork Catawba River, and Lake Wylie-Catawba River.

The level of development projected for the ICE Study Area suggests some unavoidable degradation of water resource quality is likely in the areas with the greatest growth. However, the impact per acre of new impervious surface is expected to be substantially less than for past development due to new stormwater permitting requirements. The enforcement of riparian buffer policies in the ICE Study Area is also likely to have a beneficial offsetting effect in counteracting some of the stormwater impacts of future growth. Improvements to the management of point source pollutant discharges (including wastewater treatment plants) are also expected to continue in the future.

Direct Impacts from the Preferred Alternative. The Preferred Alternative would add approximately 500 acres of impervious surface cover to the ICE Study Area, with the largest increase (approximately 200 acres) in the Upper Crowders Creek subwatershed. As discussed in the FEIS **Section 2.5.4.2**, the final design of the Preferred Alternative would incorporate stormwater treatment measures to reduce the potential for impacts to the affected watersheds.

Indirect Effects. The changes in the distribution of households and employment resulting from the Preferred Alternative could add approximately 300 acres of impervious surface cover to the ICE Study Area, or a one percent increase over the No-Build Scenario. The largest indirect increases in impervious surface cover are projected for the Catawba Creek subwatershed and the Lower Crowders Creek subwatershed. Two subwatersheds are projected to have a slight indirect decrease in impervious surface cover compared to the No-Build Scenario as a result of the Preferred Alternative, Lake Wylie-Catawba River and Upper Crowders Creek. As noted in the discussion of the No-Build Scenario, although some impacts would still occur, the incremental water quality impacts of these shifts in growth would be less than past growth due to the stormwater control and riparian buffer policies in the study area.

Cumulative Effects. The cumulative effect of past actions (e.g. existing impervious cover), other actions (the No-Build Scenario) and the direct and indirect effects of the Preferred Alternative is predicted to be 31,500 acres of impervious surface cover (19.8 percent of the ICE Study Area compared to 19.3 percent under the No-Build Scenario). The incremental effect of the Preferred Alternative accounts for 800 acres, or about 6.8 percent, of the cumulative increase in impervious surface cover from existing conditions. One subwatershed with impervious surface cover currently less than 10 percent would be at or exceed 10 percent in the Build Scenario - Upper Crowders Creek.

As noted in the discussion of the No-Build Scenario, although some unavoidable decreases in water resource quality are expected, the incremental water quality impacts of future growth would be less than past growth due to the stormwater water and riparian buffer policies in the ICE Study Area.

While impervious surface cover provides a useful metric for assessing potential cumulative effects, it is not possible to conclude from an analysis of impervious surface cover alone whether or not violations of water quality standards would occur at specific downstream locations. As part

of the application for a Section 401 Water Quality Certification for the proposed project, additional modeling of pollutant loadings in accordance with NCDENR Division of Water Quality's policy document entitled *Cumulative Impacts and the 401 Water Quality Certification and Isolated Wetlands Program* (NCDWQ, 2004) is anticipated to be required. To issue a Water Quality Certification, NCDWQ is required to determine that a project "does not result in cumulative impacts, based upon past or reasonably anticipated future impacts that cause or will cause a violation of downstream water quality standards." The water quality modeling will account for the effect of stormwater treatment practices and provide the basis for determining whether or not violations of water quality standards would occur. If violations are predicted, mitigation would be proposed to address the issue.

2.5.5.8 Potential Indirect and Cumulative Effects to Wildlife Habitat

Existing Habitat Fragmentation. The quantity and quality of upland wildlife habitats in the study area have been impacted by past development. Including urban trees, approximately 59 percent of the ICE Study Area is covered by tree cover as of 2007. At a subwatershed level, the highest percentage of tree cover occurs in the Upper and Lower Crowders Creek subwatersheds (approximately 65 percent), while the lowest percentage occurs in the heavily developed Paw Creek-Lake Wylie subwatershed (38 percent).

Figure 2-14 illustrates the forest interior habitat patches, defined based on the 300-foot edge effect zone explained in **Section 2.5.5.5**. **Table 2-18** shows that the majority of the forest interior habitat patches in the ICE Study Area are small, and there are only nine interior habitat patches greater than 500 acres in size. The largest habitat patches are located in and around Crowders Mountain State Park. Some of the large habitat patches in this area actually extend beyond the boundaries of the ICE Study Area. As expected, there are no large interior habitat patches remaining in the most heavily developed portions of the ICE Study Area, such as Gastonia.

TABLE 2-18: Forest Interior Habitat Patches in ICE Study Area

Total Acres	Forest Interior Habitat (Acres)	Percent Forest Interior Habitat	Count of Forest Interior Habitats by Patch Size (Acres)					Mean Interior Patch Size*
			Less than 20	21 to 100	101 to 200	201-500	Greater than 500	
158,802	26,967	17.0%	12,011	139	41	22	9	37.1

*Excluding interior patches of less than one acre.

Impacts from Other Actions (No-Build Scenario). Under the No Build Scenario, approximately 8,500 to 20,500 acres of tree cover could be lost as a result of projected future development, reducing the total percent forest cover in the ICE Study Area to approximately 54 to 46 percent. The loss of tree cover under the No Build Scenario would reduce the quality and quantity of upland wildlife habitat in the ICE Study Area and increase habitat fragmentation, although the degree of fragmentation cannot be reasonably quantified. Planning strategies to minimize potential impacts to wildlife habitat include encouraging higher density development in appropriate locations and preserving contiguous habitat blocks that provide the highest quality habitat.

Direct Impacts from the Preferred Alternative. The Preferred Alternative refined preliminary design would directly impact approximately 1,000 acres of tree cover, 300 acres of which would occur in the Upper Crowders Creek subwatershed. The Preferred Alternative would

directly impact 290 acres of forested interior habitat and result in indirect edge effects, potentially reducing the quality of an additional 480 acres of forest interior habitat within approximately 300 feet of the right of way. The *Gaston East-West Connector Quantitative Indirect and Cumulative Effects Analysis* provides more detailed information, including maps, regarding the impacts of the Preferred Alternative on forest interior habitat patches of 20 or more acres in size. There is a high degree of existing fragmentation in the Gaston East-West Connector corridor, and the project would incrementally increase this fragmentation.

The habitat fragmentation impacts of the Preferred Alternative would inhibit the movement of some wildlife species across the roadway and potentially increase wildlife road mortality. As discussed in **Section 2.5.4.3**, a wildlife passage structure will be studied at the crossing of Stream S156 (located between Forbes Road to the west and Robinson Road to the east) during final design of the Preferred Alternative.

Indirect Effects. Depending on the specific locations chosen for future development, the changes in the development patterns associated with the Preferred Alternative could increase tree cover loss by approximately 100 to 1,400 acres. The greatest potential for indirect effects on forest cover is within the Catawba Creek subwatershed.

Cumulative Effects. **Table 2-19** lists the projected change in tree cover by subwatershed under a low impact estimate and a high impact estimate, as described in **Section 2.5.5.5**. The cumulative effect of past actions (e.g. existing tree cover), other actions (the No-Build Scenario) and the direct and indirect effects of the Preferred Alternative is predicted to result in remaining forest cover in 2035 in the ICE Study Area of approximately 84,800 acres (low estimate of loss) to 71,400 acres ((high estimate of loss). This represents a cumulative loss of forest cover of approximately 22,900 to 9,500 acres over existing conditions, or a percent decrease of 24 to 10 percent.

The actual impacts would depend on the specific location of each new development, although the actual number will likely be closer to the low estimate. The incremental effect of the Preferred Alternative accounts for approximately 1,100 to 2,400 acres of the cumulative loss of forest cover over existing conditions. As discussed previously, the planning strategies to minimize potential impacts to wildlife habitat include encouraging higher density development in appropriate locations and preserving contiguous habitat blocks that provide the highest quality habitat.

TABLE 2-19: Estimated Change in Forest Cover by Watershed

Watershed	Total Watershed Area (Acres)	2007 Forest Cover (Acres)	2035 No Build Forest Cover (Acres)	2035 Build Direct Change in Forest Cover (Acres)	2035 Build Indirect Change in Forest Cover (Acres)	2035 Build Forest Cover (Acres)	Change in Percent Forest Cover No-Build to Build
Low Estimate of Tree Cover Loss							
Beaverdam Creek	12,000	6,500	6,500	0	0	6,500	0%
Catawba Creek	20,700	12,100	11,500	-100	-300	11,000	-2.5%
Duharts Creek-South Fork Catawba River	25,300	15,400	12,800	-100	0	12,700	-0.4%
Lake Wylie-Catawba River	10,500	6,000	4,200	-200	100	4,100	-1.0%
Lower Crowders Creek	36,700	23,800	23,700	-200	-100	23,400	-0.8%
Mill Creek-Lake Wylie	15,000	8,800	8,000	-100	0	8,000	0%

TABLE 2-19: Estimated Change in Forest Cover by Watershed

Watershed	Total Watershed Area (Acres)	2007 Forest Cover (Acres)	2035 No Build Forest Cover (Acres)	2035 Build Direct Change in Forest Cover (Acres)	2035 Build Indirect Change in Forest Cover (Acres)	2035 Build Forest Cover (Acres)	Change in Percent Forest Cover No-Build to Build
Paw Creek-Lake Wylie	11,900	4,500	3,100	0	0	3,100	0%
Upper Crowders Creek	26,500	17,400	16,000	-300	300	16,000	0%
Study Area Total - Low	**158,800**	**94,300**	**85,800**	**-1,000**	**-100**	**84,800**	**-0.6%**
High Estimate of Tree Cover Loss							
Beaverdam Creek	12,000	6,500	5,900	0	-200	5,700	-1.7%
Catawba Creek	20,700	12,100	9,300	-100	-700	8,500	-3.8%
Duharts Creek-South Fork Catawba River	25,300	15,400	10,600	-100	0	10,400	-0.8%
Lake Wylie-Catawba River	10,500	6,000	3,700	-200	0	3,500	-1.9%
Lower Crowders Creek	36,700	23,800	22,000	-200	-400	21,400	-1.6%
Mill Creek-Lake Wylie	15,000	8,800	6,900	-100	-200	6,700	-1.3%
Paw Creek-Lake Wylie	11,900	4,500	2,200	0	0	2,200	0%
Upper Crowders Creek	26,500	17,400	13,300	-300	100	13,100	-0.8%
Study Area Total - High	**158,800**	**94,300**	**73,800**	**-1,000**	**-1,400**	**71,400**	**-1.5%**

Source: *Gaston East-West Connector Quantitative Indirect and Cumulative Effects Analysis*, Louis Berger Group, Inc., August 2010.
Note: Negative values indicate loss of forest cover, positive values indicate gain.
Results have been rounded to the nearest 100 acres. Differences were calculated prior to rounding.

2.5.5.9 Mitigation

The basic requirement to consider mitigation measures is established in the CEQ NEPA regulations (40 CFR 1502.16(h)). Compensatory mitigation for the direct impacts of the Preferred Alternative to regulated resources (e.g. wetlands and streams) is discussed in **Section 2.5.4.4** of the FEIS. With respect to mitigation for indirect and cumulative effects related to land use change, both the NCDOT ICE Guidance and FHWA *Interim Guidance* note that it is necessary to identify mitigation actions beyond the control of the transportation agencies. While such mitigation cannot be committed to be implemented as part of the project, the purpose of identifying the mitigation is to inform the affected local jurisdictions and other reviewers of the EIS. Mitigation for the indirect and cumulative effects on land use, water resources and tree cover identified by this study could be reduced in magnitude through implementation and enforcement of the following planning strategies. As noted in the text below, many of these strategies are already beginning to be implemented in the study area.

- **Zoning/Comprehensive Planning** to support higher density development in planned growth areas and to discourage growth in environmentally sensitive areas. Gaston County has adopted a Unified Development Ordinance that provides new flexibility for higher density development, including Traditional Neighborhood Development (TND) and a streamlined development process. York County is in the process of developing a Unified Development Ordinance. Open Space Planning is also an important part of protecting key wildlife habitat areas. York County completed an Open Space Plan in 2009.

- **Growth Management** through restrictions on the expansion of infrastructure. Water and sewer service should be strictly tied to areas designated for growth in local land use plans. There is some evidence of consideration of this type of policy in parts of Gaston County. For example, Gaston County's "Existing Initiatives Map" identifies areas where sewer service should not be extended, including a portion of the South Fork Crowders Creek watershed.
- **Riparian buffers**. Existing riparian buffer policies applicable to the study area are discussed in Section 3.3.1 of the *Gaston East-West Connector Quantitative Indirect and Cumulative Effects Analysis*. These policies are a key aspect of water resources protection.
- **Stream Restoration**. Many urban streams have been straightened, channelized, piped and buried, and/or stripped of native vegetation. Stream restoration policies would improve directly improve habitat and water quality by addressing erosion and sedimentation issues.
- **Land Acquisition/Conservation Easements**. Conservation easement programs, such as the Gaston Conservation District Land Preservation Program are another strategy for preserving high quality wildlife habitat that can be implemented by the private or public sector. The mapping of interior forest patches conducted for this study provides information that could be used to prioritize areas for conservation planning and land acquisition investments.

2.5.5.10 Conclusion

Table 2-20 provides a summary of the estimated indirect and cumulative effects in the ICE Study Area for the 2035 No-Build Scenario and 2035 Build Scenario.

TABLE 2-20: Summary of Estimated Indirect and Cumulative Effects in the ICE Study Area

Effect	Existing Condition	2035 No-Build Scenario	2035 Build Scenario	Difference No-Build to Build
Households (Number)	60,300	102,500	106,200	3,700
Employment (Number)	58,400	91,500	91,200	-300
Residential Land Conversion (Acres)	66,900	81,000	82,200	1,200
Employment-Related Land Conversion (Acres)	16,700	11,170	11,070	-100
Impervious Surface Cover (Acres)	19,800	30,700	31,500	800
Forest Cover – Low Impact Estimate (Acres)	94,300	85,800	84,800	-1,000
Forest Cover – High Impact Estimate (Acres)	94,300	73,800	71,400	-1,400

Note: Existing conditions are for the year 2005 for Households, Employment, Residential Land Conversion, and Employment-Related Land conversion. Existing conditions are for the year 2007 for Impervious Surface Cover and Forest Cover.

The land use forecasting conducted for this quantitative ICE study shows that the potential for indirect land use effects is greatest in southern Gaston County and northern York County. These areas would experience the largest increase in accessibility with the project. Up to 3,700 additional households and 300 fewer jobs are anticipated in the ICE Study Area as a result of the indirect development shifts associated with the project. This is not new growth, but rather represents households and employment that would have located elsewhere in the Metrolina region under the No-Build Scenario. At the regional scale, household and employment totals remain constant between the No-Build and Build conditions. The overall indirect effect of the project for the ICE Study Area as a whole is relatively small in comparison to the growth in households (42,200) and employment (33,100) expected between 2005 and 2035 under the No-Build Scenario. For households, the difference is a 3.6 percent increase from the No-Build Scenario to the Build Scenario. For employment, the projected difference between the No-Build Scenario and Build Scenario is 0.3 percent. Note that for areas showing a "decrease" from the No-

Build Scenario to the Build Scenario in households or employment, this represents a decrease in future growth, not a decrease relative to existing conditions.

The land use forecasting results are consistent with Gaston County's land use plan, but may be inconsistent with York County's plan for rural residential and agricultural uses in the northern portion of the county. Local land use regulations will be key in shaping the location and form of development in the ICE Study Area.

In terms of environmental impacts, over 10,900 acres of impervious surface is expected to be added to the ICE Study Area by 2035 under the No-Build Scenario. Between 8,500 and 20,500 acres of tree cover could be lost under the No-Build condition.

The proposed project would directly and indirectly affect the environment. The total incremental effect of the Build Scenario on impervious surface cover (direct and indirect) is an addition of 800 acres to the increase in impervious surface cover projected under the No-Build Scenario. The total incremental effect of the project on tree cover is estimated to be a loss of 1,100 to 2,400 acres over the No-Build Scenario.

Numerous planning strategies are available to reduce the impacts of future growth on water resources and wildlife habitat, including zoning/comprehensive planning, growth management, riparian buffers, stream restoration, and land acquisition.